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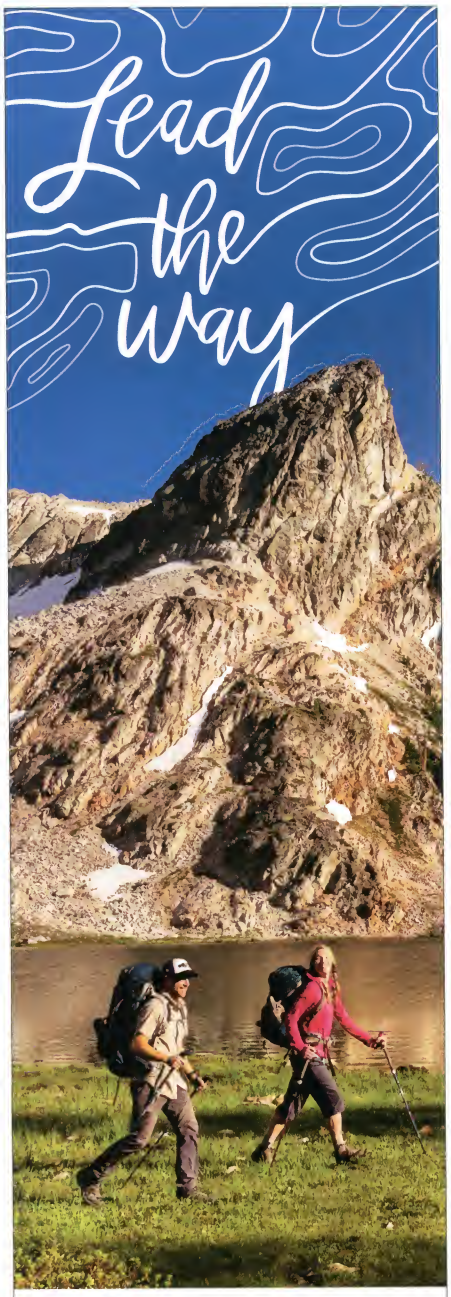
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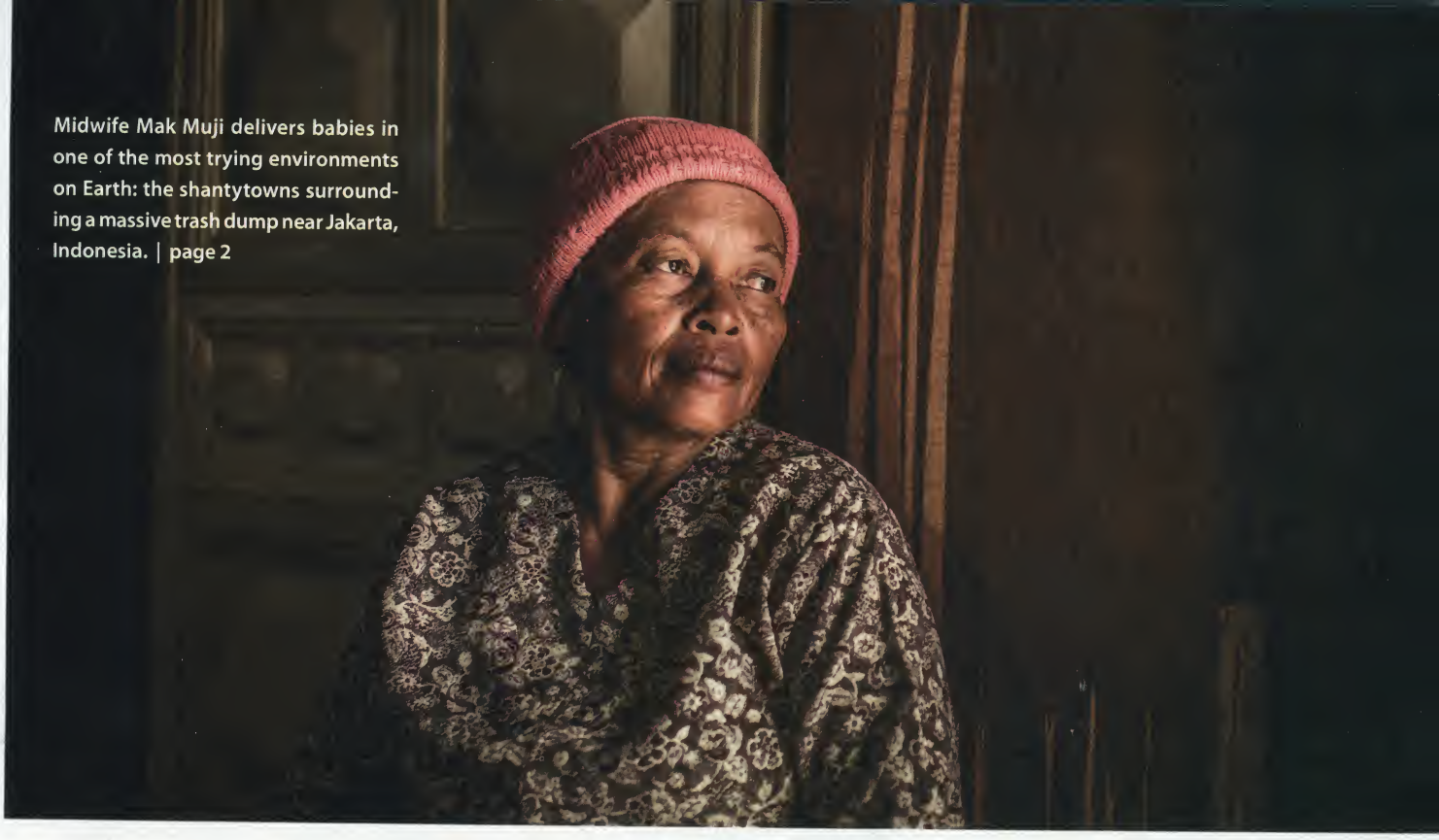
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Midwife Mak Muji delivers babies in one of the most trying environments on Earth: the shantytowns surrounding a massive trash dump near Jakarta, Indonesia. | page 2

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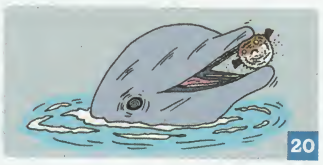
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LIFE IN LANDFILL

PHOTOS BY ELISABETTA ZAVOLI

Within the Indonesian city of Bekasi, just east of Jakarta, thousands of people are living in garbage. Mak Muji, a 55-year-old midwife, and other trash pickers reside in several small villages adjacent to Jakarta's largest landfill, Bantar Gebang, where mountains of plastics, metals, clothes, and other solid waste rise almost 10 stories tall. The smell is so overwhelming that residents recently demanded compensation ("stench money") from the local regency controlling the site.





Right: Muji visits her neighbor, who is seven months' pregnant, and checks to see if the baby is in the right position for birth.

Below: Muji climbs up a mountain of garbage at Bantar Gebang. She collects plastics, glass, cans, shoes, and iron to sell to recycling factories.





Left: A pregnant woman sorts through garbage in front of her shack. When women can no longer collect trash, they often help their families by picking through bags of materials.

Below: Muji helps take care of newborns, including washing them and monitoring their growth to determine if they need supplemental formula.







You're Recycling Wrong

I'M GOING TO GUESS that you, a reader of *Sierra* magazine, are what they call an "avid recycler." You recycle everything you can. You flinch when you see someone throw a soda can into the trash and have even been known to fish it out and put it in the recycling bin.

Recycling's popularity with environmentalists is not mysterious. In a distressing world full of complicated choices, it appears to be an unalloyed good. While many of today's problems are enormous and apocalyptic, what we do with our refuse is something we can control, something we can practice every day to limit the harm caused by our own lifestyles. We can do the responsible thing, keep trash out of landfills, and use the same raw materials over and over in a virtuous circle.



I'm that guy too. I nag my children, correct my coworkers, and remove the little plastic film from tissue boxes. So when my grocery store stopped accepting used plastic bags for recycling, I had to ask why. "The company that used to take 'em went out of business," the manager said, "and we can't find anyone else who wants them."

Longtime contributor Edward Humes (author of *Garbology*) explains why in the anchor story of this issue's special section on recycling ("You Can't Recycle Garbage," page 24): After taking our poorly sorted plastic and food-stained paper for a quarter century, China called it quits. A lot of the plastic crap we sent overseas never got recycled at all, it turns out—it just got dumped, with millions of tons of it flushing down China's rivers to feed the Great Pacific Garbage Patch. The six-pack rings those sad sea creatures get their heads stuck in might very well have come from the bins of well-meaning US recyclers. (Those rings, by the way, are not generally recyclable anyway. Like most plastic that's not #1 or #2 bottles, they're garbage.)

Although China's turnabout has been widely portrayed by the media as a crisis for recycling, Humes sees it as an opportunity to remake our domestic industry. We already have models for that reinvention, starting with community recycling operations that flourish by going back to basics: taking clean, well-sorted materials only and refusing the rest. And US businesses are eager for the recycled feedstock. Humes cites the example of CarbonLite, a US firm that has an innovative method for recycling plastic beverage bottles and whose growth is limited by a lack of raw materials—too many bottles still end up in landfills.

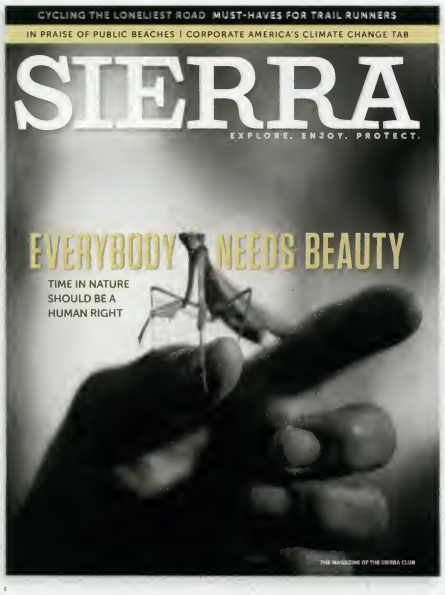
Reinventing recycling, however, may require abandoning our old goal of recycling everything. A new study (page 29) finds that the total environmental costs of recycling sometimes outweigh those of landfilling. Remember the mantra "Reduce, Reuse, and Recycle"? There's a reason recycling is third in that list—reducing and reusing are far more important. You don't have to recycle the plastic bag you don't use. ***—Paul Rauber, senior editor***

Nature Rx

I was moved reading Richard Louv's article, "Outdoors for All," in the May/June edition of *Sierra*. In the university class I teach, Foundations of the Human Movement Sciences, my students read the chapter "The Nature Prescription" from Louv's book *The Nature Principle*. Students are then assigned to go to a favorite place in nature with no technology for at least 45 minutes and, when they return, write a short essay on the experience.

Most of their reflections fill me with sadness. Often, they share how difficult it was for them to be separated from their phones. Some actually experience symptoms of withdrawal, such as increased anxiety. Typically it takes students several minutes to settle before they can experience the natural surroundings. Many of the students comment on how the experience brought back memories of their childhood, when they often played outdoors with friends, enjoying the sights, smells, and sounds of their environment. As I grade and return their papers, I remind them to try to get a regular dose of "vitamin N."

John Kilbourne
Allendale, Michigan



The Disadvantaged Need Nature the Most

The editorial in the May/June edition, "Everybody Needs Beauty," is a welcome message about the healing properties of being outdoors and how we need nature to survive. My shortest route to connecting with nature's beauty was to sell my car and move downtown. It's been over five years, and I have never looked back. I would

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CARTOON: JOEL PETT

just make one addition to the editorial: Our efforts at making outdoor spaces inclusive must also focus on incarcerated people, refugees and others fleeing inhumane circumstances, people who have no home or shelter, and those who have lived or fought in war zones.

Mary Sharon Moore
Eugene, Oregon

Cheaper Socks, Please

The May/June edition includes several articles about increasing public access to nature, especially for disadvantaged communities. In the same issue, you have a page about products for trail running that, among other items, includes a $60 pair of compression socks. The contradiction amid your journalism is amazing. The environmental movement is accused of being elitist and insensitive to people at the low end of the economic order. Despite this issue being raised often, *Sierra* magazine seems to simply not get it. Either ensure that your product reviews match your mission, or do away with them altogether.

Marty Bigos
San Francisco, California

Save the Fish

I was disappointed that the "Ask Mr. Green" column in the May/June edition addressed the relative safety of various canned-tuna brands instead of simply encouraging a meat-free diet that respects all animal life. In that same issue, the article about how to understand various food certifications ("What's in a Label?") provided guidance for choosing among "animal welfare approved," "hormone- and antibiotic-free," and "certified humane" meat, dairy, and eggs.

There is no such thing as gentle slaughter or humane exploitation of animals, period. If the Sierra Club promotes animal welfare and conservancy, I expect more overall consistency in its advocacy. Adopting a vegan diet is the simplest change people can make in their daily lives to promote environmental sustainability.

Evan Callan
Chicago, Illinois

ELECTION RESULTS ARE IN

The Sierra Club is a democratically run organization, and each spring members elect five people to serve three-year terms on the board of directors. Here are this year's elected members:

Aaron Mair (New York)
public health analyst

David Scott (Ohio)
attorney

Ansje Miller (North Carolina)
environmental policy analyst

Oliver Bernstein (Texas)
communications professional

Mike O'Brien (Washington)
Seattle city council member

CORRECTION

In January/February's "Global Warming Fever," we incorrectly stated that fleas transmit heartworm; in fact, mosquitoes are the culprits.

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Dan Chu Executive Director

Explore, Enjoy, and Listen

Stories help connect us to the issues we care about, and to each other

I CAN'T SAY FOR CERTAIN that humans are the only storytellers on the planet (not long ago, scientists believed incorrectly that we had a monopoly on using tools). I am sure, however, that storytelling is an essential aspect of our humanity. As such, it can be a powerful tool for social change: If you want to change someone's mind, give them facts. If you want to change someone's heart, tell them a story.

John Muir wasn't invited to be the president of the newly formed Sierra Club because he knew the most about wild places (he didn't) or because he passionately loved mountains (he did). Muir's accounts of being in wilderness—from his harrowing tale of riding out a thunderstorm in the upper reaches of a giant fir to his lyrical tribute to the water ouzel—changed how many people saw nature, from something fearsome to be conquered to something wondrous to be cherished.

Muir famously believed that taking people to wild places would motivate them to protect those places. But the journey doesn't have to be literal. In 1892, at the second-ever gathering of Sierra Club members, explorer John Wesley Powell told the story of his expedition through the Grand Canyon. Visit *bit.ly/sc-bulletins* to take a look at some early volumes of the *Sierra Club Bulletin,* which eventually evolved into this magazine; you'll find them filled with firsthand stories about exploring and enjoying wilderness. These stories did as much as anything to create community among the early advocates for wilderness.

The importance of stories never changes, but how we tell them does. In the 1960s, for instance, the Sierra Club's first executive director, David Brower, collaborated with photographers such as Ansel Adams and Eliot Porter to publish then-revolutionary "exhibit format" books—an early incarnation of what we now know as coffee-table books. The first of these, *This Is the American Earth,* was sent to every member of Congress and may have been a factor in the passage of the Wilderness Act just a few years later.

Even in this age of social media and shrinking attention spans, people still respond to a gripping story. But to effect change, we can't just be good at telling stories—we have to be good at listening too. Protecting the environment is a goal shared by a multitude of communities and allies. We can help by listening to others' stories, then sharing and amplifying them.

Some of my favorite stories in the Sierra Club's new podcast, *The Overstory* (download it at *sc.org/overstory*), are the ones where we hear directly from the people affected by and fighting against environmental injustice, whether those voices come from the Arctic tundra or the Appalachian hills. In episode 4, for example, John and Ruby Laury describe the fight to protect their home in Buckingham County, Virginia, from a gas-fired compressor station planned for the Atlantic Coast pipeline. Hearing the determination in their voices, you can't help feeling invested in their struggle. Such compelling stories remind us that behind the issues we care about—from clean energy to toxic waste—are real people with their own hopes, fears, and uncertain futures.

Part of being human is wanting our own story to be heard and understood. Some have a gift for telling those stories in ways that enthrall and persuade others. But every single one of us has the capacity to learn from the stories of others. As we work to change the world, that may well be the single most powerful action we can take. All we have to do is listen.



The importance of stories never changes, but how we tell them does.



MICHAEL BRUNE is the executive director of the Sierra Club. You can email him at *michael.brune@sierraclub.org* and follow him on Twitter *(@bruneski)* and Facebook.

JAIME JACOB; BRUNE PHOTO: JOSH DEWARE

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Sleepwalking to Oblivion

Nick Brandt's elegy for a disappearing world

NICK BRANDT WAS ON Africa's Serengeti Plain in 2007 when he took one of his most iconic photographs. *Portrait of Lioness Against Rock* is the archetype of animal portraiture: Captured in profile, the cat peers into the distance with a disaffected, powerful gaze. One almost feels the breeze smoothing over the charcoal tufts on her bronze coat.

A decade later, we encounter another lioness in Brandt's work, but the look and feel could not be more different. In *Petrol Station With Lioness,* from *This Empty World* (Thames & Hudson, 2019), a cat cast in a siren-red glow kicks up dust from denuded ground. She appears overcome with fear—a still frame of crisis. In juxtaposition, the men in the background stand around a gas station listlessly, hands in pockets.

The image epitomizes the exasperation dominating Brandt's current work. In *This Empty World,* beauty is exchanged for depravity, veneration for victimization. One hears Brandt calling out to us from nearly every photograph: Wake. Up.

"We are so caught up in our own lives, in what's going on through the prism of what we see on our iPhones, that we don't see the destruction happening all around us," Brandt told *Sierra*.

This Empty World is the culmination of Brandt's two-decades-long career photographing in Africa. In a trilogy of animal portrait collections—*On This Earth* (2001–04), *A Shadow Falls* (2005–08), and *Across the Ravaged Land* (2010–12)—Brandt presented his work as a counterpoint to conventional wildlife photography, eschewing glossy showcase shots for portraits that capture the personality, society, and intelligence of elephants, lions, and rhinos, among other animals.

But eventually, taking dignified, soulful portraits of disappearing species wasn't enough. As poachers in East Africa slaughtered with impunity and industrial development destroyed fragile ecosystems, Brandt felt compelled to act. In 2010, he cofounded the Big Life Foundation, which today coordinates over 200 rangers protecting 1.6 million acres of the Amboseli-Tsavo-Kilimanjaro ecosystem.

Perhaps the clearest intersection between Brandt's art and activism arrived in 2016 with *Inherit the Dust*. He printed life-size photos of endangered species and installed them in human

***River of People With Elephant at Night,* a composite photograph from *This Empty World*.**



landscapes—garbage dumps, factories, rock quarries, alleyways—creating a kind of elegy for a disappearing world.

This Empty World is similarly ambitious. Brandt fixed camera boxes at locations on Maasai ranchland (not on protected parkland). When animals came into view, the motion sensors triggered the lights and cameras. Later he staged scenes of human habitation and industry in the exact same spots where the animal pictures had been taken, constructing elaborate sets and using a hired cast of locals. He then stitched together the images—taken weeks, sometimes months, apart—to create composites.

The results are cinematic and dystopic: a rhino surrounded by car tires, a gazelle stranded in a village roundabout. The humans look as victimized as the animals—consummating a shared sense of melancholy and loss. The real villain is out of frame, represented by a garish red or blue light: human industry, human development, human ignorance.

"My motivation is my anger and despair at what we are losing, that the human race is sleepwalking its way to oblivion," Brandt said.

In *River of People With Elephant at Night,* 500 men and women stand in two lines. All are looking down, their faces lit up by the sickly blue glow of their cellphone screens. Between the lines, at the center of the frame, a lone elephant towers above them.

One gets the sense that at some point, they will all look up and the elephant will be gone.

Too late. ***—Jonathan Hahn***

MORE ONLINE

For a slideshow and an interview with Nick Brandt, go to *sc.org/brandt.*

NICK BRANDT

For the Love of Bugs

A celebration of the pests we love to hate

When warm weather arrives, bare skin becomes a bull's-eye for wasps, gnats, horseflies, and other annoying arthropods. It can be hard to remember the benefits of sharing the biosphere with up to 10 quintillion insects.

In *Buzz, Sting, Bite: Why We Need Insects* (Simon & Schuster, 2019), Anne Sverdrup-Thygeson comes to the defense of the "tiny critters that all do their little bit to save your life, every single day." A professor of conservation biology at the Norwegian University of Life Sciences, Sverdrup-Thygeson is a lively, witty, and discerning guide through the scientific lore surrounding some of the tiniest—though still very powerful—organisms on Earth.

Whether spotlighting the gall wasps that provided the ink on the Declaration of Independence, the fruit flies that have made Nobel Prize–winning research possible, or the midges that give us chocolate, each chapter makes the case that we need insects more than they need us. Sverdrup-Thygeson's tone is almost exclusively positive, celebrating giant bumblebees as pollinators, dung beetles as cleaners, and mealworms as protein sources. Even mosquitoes get props for serving as food for birds, bats, and other animals. The occasional lament that climate change is wreaking havoc upon many insect species adds an important note of urgency.

Buzz, Sting, Bite isn't a deep dive into entomology. Rather, it's a zippy, enjoyable sampler of the subject, suitable for bio-curious teens and adults alike—and it provides a convincing argument for showing a little restraint before reaching for the flyswatter. ***—Michael Berry***



The Butterfly Effect

A scientist races to save some of the world's rarest butterflies

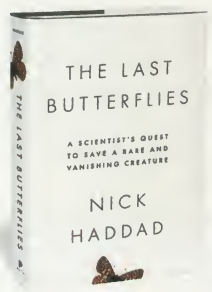
With their delicate wings and kaleidoscope patterns, butterflies appear fragile, but they're one of nature's most resilient insects. Moth and butterfly fossils date back 200 million years. Today some 20,000 butterfly species inhabit the planet.

Yet according to one study, the average population of moth and butterfly species around the world has plummeted by 30 percent during the past 40 years. "When viewed over a century, the trajectory of the rarest butterflies can be summarized in only one direction: downward," writes Nick Haddad in *The Last Butterflies: A Scientist's Quest to Save a Rare and Vanishing Creature* (Princeton University Press, 2019).

Focusing on six rare species, Haddad tells the story of how human manipulation of landscapes precipitated this rapid decline. The construction of Miami eviscerated habitats for the Schaus' swallowtail and the Bartram's scrub-hairstreak. San Francisco's sprawl wiped out habitats of the Xerces blue and the Sthenele satyr and caused their extinction. Extreme droughts related to climate change exacerbate the impacts of habitat loss, creating a downward spiral.

But there are heroes in this story, and Haddad does a wonderful job of celebrating them. He profiles ecologists including Stuart Weiss, who discovered the connection between nitrogen pollution and butterfly losses and led efforts to recover the bay checkerspot, and Cheryl Schultz, whose decades-long stewardship of the Fender's blue created a road map for protecting and recovering its populations.

The concept of "the last butterfly," Haddad writes, "is at the same time preposterous and real." It will take a better understanding of natural history—and how anthropogenic climate change is scrambling the ecologies on which butterflies depend—to have any chance of saving them. ***—Jonathan Hahn***





Hey Mr. Green! Is there Earth-friendly disposable dishware?

Q: Our church uses washable dishware most times, but we keep a supply of disposable cups and plates. It's time to order more, and there are many to choose from. Is the best choice paper with no wax? Paper with wax? Styrofoam? ***—Dorinda in East Lansing, Michigan***

A: Your question seems simple enough, but it points to a staggering problem: Some 60 billion paper cups are thrown away every year in the United States. Stacked end to end, that number would total about seven or eight round-trips to the moon. The problem is that single-use dishware is often coated with polyethylene, a plastic that cannot be recycled or composted. Most coffee cups and about 10 percent of paper plates are coated with the stuff.

If you really need disposable dishes, order those treated with polylactic acid, which can be composted. Eco-Products sells them (go to *bit.ly/polylactic* for more info). Avoid Styrofoam at all costs—it is difficult to find a recycler that will take it.

The best thing for Mother Earth is to avoid paper cups and plates altogether, but you can also try those made from alternative materials. Greenwave, Bambu Veneerware, and Green Paper Products offer bamboo options. Visit *bit.ly/cup-reuse* for ideas on what to do with cups instead of just dumping them.

Q: I live in a rural location in northern Michigan and buy pantry goods and fresh produce at a local store. Is my carbon footprint smaller if I purchase fresh fruit and veggies or frozen produce? I normally buy fresh, but the frozen products are good in quality and price.

—Michele in Brimley, Michigan

A: The answer depends on what you're buying and the time of year, how far it's been shipped, and whether it arrives by rail, road, water, or air. More than 30 percent of our vegetables and 50 percent of our fruit is now shipped from other nations. Shipping imported produce by air has the biggest carbon footprint, because it can require almost 24 times more energy than rail transport and emit 42 times more carbon dioxide than a ship hauling the same cargo.

Find out what is grown close to where you live. When fruits and vegetables are not in season in your region, importers typically use airplanes to get that produce to you. For a helpful list of when fruits and veggies are in season, go to *bit.ly/fresh-frozen*.

Sometimes, frozen food offers better nutrition than fresh, especially when fresh produce is shipped long distances. The freezing process typically keeps nutrients intact; if fresh produce is in transport and sitting on grocery shelves for days, it can lose those benefits. One study found that fresh broccoli harvested out of season and shipped retained only half as much vitamin C as broccoli grown in season and closer to home. Researchers also discovered that the nutrient content was higher in some frozen broccoli, corn, green beans, and blackberries than in their fresh counterparts.

—Bob Schildgen

MORE ONLINE
Get more advice from Mr. Green and submit your own questions for him at *sierraclub.org/mrgreen*.

ILLUSTRATION BY LITTLE FRIENDS OF PRINTMAKING

More Online

Toxic Diapers and Pads

sc.org/toxic-diapers

A new study found that many name-brand diapers and sanitary pads contain toxic compounds that are likely absorbed over time via the genitals.

Is Your Bank Financing Climate Catastrophe?

sc.org/climate-banks

Major banks—maybe even yours—are robbing us of a chance to live and thrive in a stable climate.

7 Ways to Bike Tour

sc.org/bike-tours

Looking for an adventure ride this summer? Choose the best fit from among these multiday options.

Goats Are People Too

sc.org/goats

Kevin Horan's new book, *Goats and Sheep,* is part of the photographer's ongoing project to "look at animals as people, people as animals."

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In March and April, lucky kayakers may cross paths with gray whales cruising the extensive archipelago of Haida Gwaii.

Paddling Among Giants

FROM MY PLANE WINDOW, the islands of Haida Gwaii rise from the Pacific mist like mountains floating in the sky. The chain of 150 moss-draped isles, 62 miles off the northern tip of British Columbia, is known as the Galápagos of the North for the many plant and animal species that exist there and nowhere else. One of the most isolated locations on Earth, it's a place where ancient forests of cedar and Sitka spruce soar hundreds of feet into the air, black bears prowl the shores, and orcas rule the waves.

Haida Gwaii—known as the Queen Charlotte Islands until 2010—is also one of the top sea-kayaking destinations in North America. Numerous routes circumnavigate Gwaii Haanas National Park Reserve, located on Moresby, one of the archipelago's two main islands. Most routes take paddlers to one of Haida's most treasured cultural sights, SGang Gwaay. This ancient village, abandoned in the 1880s, contains

a magnificent collection of carved poles and remains a potent spiritual and historical site for the Haida people, who have lived on these islands for at least the past 12,500 years.

Each spring, gray whales migrate through the archipelago and Alliford Bay, which surrounds the tiny villages of Skidegate and Queen Charlotte. To find the whales, I teamed up with Green Coast Kayaking, one of Haida Gwaii's most respected eco-tour operators. The plan was to spend three days paddling the bay—where the whales are known to scratch their skin against the rocks near the shore—and to camp on the deserted beaches of remote islands.

It's a place where ancient forests of cedar and Sitka spruce soar hundreds of feet into the air, black bears prowl the shores, and orcas rule the waves.

The first day, our group of four put in at the Queen Charlotte docks and paddled roughly five miles southwest to Lina Island for a picnic of candied-salmon salad with dill and fresh tomatoes. The next day, we headed three miles south, crossing a narrow channel on the western edge of Maude Island and tracing its southern shore back east, where we thought the whales might be. Along the way, bald eagles soared above and seals bobbed curiously behind. We ate kelp straight from the ocean and spruce tips from a tree. When the sun shone on the water, paddling was like gliding on stretched velvet. When squalls blew, the sky swirled in mists of blue and gray, brooding clouds, and sudden shafts of rainbow.

We didn't spot any whales that day, but we did find something special: Haina. Community elders granted us permission to visit their ancient Haida village site on the eastern point of Maude Island. Emerging from the sea was like stepping back in time: We could see holes where monumental poles once stood, and the straight, embossed lines of longhouses poking up through the moss and fern that are slowly reclaiming the structures. The fact that anything at all remains in Haina and elsewhere on the islands is in large part thanks to one man.

I met Captain Gold, a renowned Haida elder, back on dry land at the end of my trip. In 1973, fed up with the degradation of Haida heritage sites, mostly from neglect and visitor damage, Gold got in his canoe, paddled 150 miles from his home on the archipelago's largest island, and set up camp beside the then-unprotected site of SGang Gwaay to keep watch over it during the high-traffic summer.

At the time, people thought Gold was crazy. But his idea changed these islands forever, as it helped lead to the formation of the Gwaii Haanas National Park Reserve (now run in conjunction with the Haida), to SGang Gwaay being designated as a UNESCO World Heritage Site, and to the founding of Parks Canada's Watchmen program, which employs Native people to educate visitors at key ancestral sites and to monitor fisheries, forests, and other resources. That model of Indigenous-led conservation has since inspired other First Nations people, including the Tseshaht along the coast of Vancouver Island, to adopt similar strategies. "It's about pride," Gold explained. "I want to allow these places to return to the earth with dignity."

It's not all happy endings, of course. Canada's First Nations face many obstacles, and Haida Gwaii is no exception: Logging, overfishing, and pipelines are major, ongoing concerns. But Captain Gold's Watchmen program is a seed for a new form of conservation marked by values passed down through millennia: coexistence, respect, and humility. Haida culture, he says, is resurging.

But still, two days in and no whales. Then, paddling back on our last day, we saw spume in the distance, then dark shapes breaching the surface like shadows on waves. We kept our distance, but as we waited, the sprays came closer. I felt the water ripple around me, the kayak shake. Then suddenly, without warning, a gray whale broke through the surface less than 10 feet away. My heart raced: At 50 feet long, it was a genuine monster of the deep, blowing air, its breath smelling of the ocean. But it was gentle too, a sentient being. And its presence momentarily united our two worlds, land and sea. Just as Haida Gwaii does.

—Aaron Millar

Take a Sierra Club trip to British Columbia. For details, see *sc.org/adventure-travel.*



WHERE Haida Gwaii, off the northern coast of British Columbia, Canada

GETTING THERE While it's possible to reach the islands via ferry (a 16-hour ride from Vancouver Island's Port Hardy to Port Prince Rupert in northern British Columbia plus another eight-hour ferry to Haida Gwaii), most visitors fly direct from Vancouver to the airport at Sandspit. From there, it's about an hour by taxi to Queen Charlotte.

GETTING AROUND If you're just kayaking or traveling with an organized tour, a rental car isn't required. But if you're hoping to explore other parts of the archipelago, it's essential.

WHEN TO VISIT Whale-spotting season is March through October; July and August offer the best chances for orca sightings and the driest weather.

MUST-SEE The ancient village of SGang Gwaay, in Gwaii Haanas National Park Reserve—the islands' best-preserved Haida cultural site.

PRO TIP Bring wet-weather gear: neoprene pants, gloves, and a proper paddling jacket.

BOOK IT A three-day guided tour with Green Coast Kayaking (*gckayaking.com*) costs about $600 per person, including all meals and equipment.

UNEXPECTED FUN Staying at the Float House in Queen Charlotte, a cozy houseboat with a wood-burning fireplace, right on the shores of Alliford Bay.

MORE *bit.ly/haida-gwaii-info*

OPPOSITE: ANDREW TOMAYKO; MAP: STEVE STANKIEWICZ

Derailed Thru-Hike

I WAS MORE THAN 1,100 MILES INTO MY THRU-HIKE OF THE PACIFIC CREST TRAIL WHEN I CAME TO A LINGERING FINGER OF SLUSH BLOCKING THE TRAIL IN THE GRANITE CHIEF WILDERNESS. IT WOULD TAKE LONGER TO PUT ON MY CRAMPONS AND UNSTRAP MY ICE AX, I THOUGHT, THAN TO JUST WALK ACROSS. —ALEX BROWN



AFTER A MONTH OF SLOW PROGRESS, I WAS EAGER TO MAKE UP LOST TIME. **I TOOK A FEW CAUTIOUS STEPS** IN THE DEEP WELLS LEFT BY OTHER HIKERS. I WAS HALFWAY ACROSS . . .



. . . THEN I WAS HALFWAY DOWN THE SLOPE. **MY FOOTHOLD HAD GIVEN OUT.** "OF ALL THE THINGS TO GET ME," I THOUGHT AS I FELL. "LAZINESS." I FEARED MY THRU-HIKE WAS OVER.



I WAS ALMOST AT THE END OF THE SNOW RAMP. WITHOUT THINKING, **I DUG MY HEELS INTO THE SNOW** AS HARD AS I COULD.



I SLID OVER SOME BOULDERS—WHICH FORTUNATELY WERE FLAT—AND INTO A TREE, USING MY KNEES AS SHOCK ABSORBERS.



I STOOD UP. NOTHING WAS BROKEN, BUT I GOT A SOUVENIR ROAD RASH ON MY BACKSIDE.

Ask the Expert

Eli Boschetto is the author of *Hiking the Pacific Crest Trail: Oregon.*

"No matter how big, small, or repetitive the challenge, it's always better to err on the side of caution. Accidents happen when you least expect them. Alex could have geared up in a few minutes, which would have been less time-consuming—and less painful—than his slide down the mountain and subsequent climb back up."

ARE YOU A SURVIVOR? Send your tale of backcountry peril to *submissions.sierra@sierraclub.org* or share it with us on Facebook.

ILLUSTRATIONS BY KOREN SHADMI



Varshini Prakash is the cofounder and executive director of the Sunrise Movement.

KAYANA SZYMCZAK

Blueprint for Change

Building a movement that tackles climate change and inequality

VARSHINI PRAKASH WAS IN SIXTH GRADE when the 2004 Indian Ocean tsunami hit Chennai, the city in India where her grandmother lived. She remembers how powerless she felt, watching the footage at home in Acton, Massachusetts. Not knowing what else to do, Prakash gathered cans of food to donate to the Red Cross.

In high school, Prakash was shocked to learn about the Great Pacific Garbage Patch and other environmental problems, but aside from joining the recycling club and micromanaging how her friends recycled, she didn't have an outlet for her anger. She made a pact with herself that college would be different.

At the University of Massachusetts Amherst, Prakash became involved in the school's fossil fuel divestment campaign and spoke publicly for the first time at a rally. "I just fell in love with organizing in a way that I had never imagined," she says.

But the more Prakash engaged with the issue of climate change, the more frustrated she grew with politicians unwilling to address it. What, she wondered, would an effective political movement demanding a response to the climate crisis look like?

In 2016, she and 11 of her peers started meeting regularly to try to answer this question. For over a year, they studied the civil rights, anti-apartheid, and other movements, creating the blueprint for what would become the Sunrise Movement—a youth-led grassroots effort intent on stopping climate change and promoting a just economic system.

Last November, the group made headlines when it staged a sit-in outside Democratic leader Nancy Pelosi's office and (then representative-elect) Alexandria Ocasio-Cortez showed up.

Since then, Prakash and other Sunrise activists have held high-profile sit-ins and protests across the country to build support for the Green New Deal. They also work to get candidates for office to forgo fossil fuel donations and commit to making climate change a campaign priority.

"We do the big moments—like at Pelosi's office—that kind of shift the center of gravity," Prakash says. "And we use that momentum to build organizing on the ground that won't peter out." *—Leanna First-Arai*

Broad Support According to a study by Yale and George Mason Universities, 92 percent of Democrats and 64 percent of Republicans are in favor of a Green New Deal.

This article was funded by the Sierra Club's Beyond Coal campaign (beyondcoal.org).

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A March explosion at a Houston-area petrochemical plant released tens of millions of pounds of pollutants.

ELIZABETH CONLEY/HOUSTON CHRONICLE/AP

Boom Goes the Plastics Industry

With the transportation and energy markets in decline, fossil fuel companies look to plastics

EARLY IN THE MORNING on Sunday, March 17, Terri Garcia picked up the phone to a frantic barrage of questions from her mother: "Where are my grandbabies? Where's your brother? What are your nephews doing?" Garcia had no idea what had upset her mother until she looked out her back window and saw a column of black smoke rising from one of the numerous fossil fuel facilities near her home in Deer Park, 15 miles southeast of Houston.

A leaking pipe at a Mitsui & Co. Intercontinental Terminals Company facility five miles from Garcia's house had sparked a fire in one of the nearly 250 massive tanks that hold as much as 3.3 million gallons of petrochemicals apiece. The fire quickly spread, releasing 6 million pounds of pollutants in the first 24 hours. The fire continued on and off for five days, releasing cancer-causing benzene. On the third day, Garcia's daughter and her classmates could see the flames burn and the black smoke stretch overhead from the second-story window of their elementary school. When nearby resident and mother of four Sema Hernandez came to the school, "it looked like the entrance to hell," she said.

Mitsui & Co. stores highly toxic byproducts of the oil-refining process for clients including ExxonMobil, Chevron, and Phillips 66. The

petrochemicals burned in the fire included naphtha, xylene, and toluene. They are not exactly household names, but among their uses is the manufacture of plastics: These fossil fuel derivatives are the cornerstones of the excessive plastic packaging that encases our water, fruits and vegetables, granola bars, and toiletries.

Facing intensifying global efforts to curtail the use of oil and gas for transportation and energy—and at the same time seeking markets for the torrent of oil and gas from the US fracking boom—the fossil fuel industry is looking to plastics as a lifeline. Today, 14 percent of oil and 8 percent of gas is used for the manufacture of petrochemicals, the essential feedstock of plastic production. The International Energy Agency predicts that by 2050, 50 percent of the growth in oil demand will be related to petrochemicals, overtaking the oil-demand growth related to automobile transportation.

By 2050, 50 percent of the growth in oil demand will be related to petrochemicals.

ExxonMobil and Saudi Aramco, among the world's largest fossil fuel companies, are betting big on plastics. In its latest investor report, ExxonMobil acknowledged a sharp decline in demand for gasoline. The company expects it will help fill the gap with chemicals and predicts a 30 percent increase in demand by 2025. A recent investor article released by Bank of America Merrill Lynch was titled "Oil's Future Paved With Plastic."

This pivot is already well underway. The excess of oil and gas has contributed to a frenzy of pipeline construction geared toward shipping ever greater quantities of fossil fuels to the coasts, where facilities distill the chemical building blocks needed for plastic production. The American Chemistry Council reports that since 2010, plans for 333 new chemical-manufacturing projects have been announced in the United States, representing more than $200 billion in capital investments; the industry association notes that "much of the investment is geared toward export markets for chemistry and plastics products." A great deal of the build-out is along the Gulf Coast, led by Chevron, Phillips 66, and ExxonMobil. Shell Oil and other companies are building chemical-production capacity on the East Coast and along the Ohio River in Pennsylvania and Ohio.

The result of this increased production is that it is now cheaper than ever to produce single-use plastic for consumer packaging—the number one end use of plastic. Yet while plastics is surging, popular concern about the impacts of plastic pollution is mounting. In response to this movement, ExxonMobil, Shell, and Dow Chemical recently formed the Alliance to End Plastic Waste, to help "end the flow of plastic waste into the environment."

Carroll Muffett, president of the Center for International Environmental Law, sees this as a blatant attempt to distract the public and deter efforts to restrict or regulate the means of fossil fuel and plastic production. The fossil fuel industry "has been very effective at shifting the narrative from production to the end of the plastic life cycle," he argues. "By focusing on plastics as a waste-management and marine-litter problem, the industry makes its own contributions to the plastic crisis invisible." In February, CIEL released an 80-page report identifying a human "health crisis," including increased risks of cancer, stemming from harms presented at every stage of plastic production, consumption, and disposal.

"Plastics are not just harmful to sea creatures and waterways," says Priscilla Villa, a Texas-based organizer for the watchdog group Earthworks. She says the chemical-plant build-out in Texas and Louisiana shows a "blatant disregard for the people who have to live near these facilities and the type of risk they have to face to their health, safety, and environment."

In their homes near Houston, Garcia and Hernandez think about their children and the potential long-term health impacts of the Mitsui & Co. petrochemical fire—just one of countless daily pollution events caused by the industry—and neither can control her tears. They cannot afford to move, nor do they want to, as they love their communities. "They're the ones creating the pollution," Hernandez says of the fossil fuel companies. "Why shouldn't they be forced to leave?"

—Antonia Juhasz



TRUMP WATCH

Courts say no

The Sierra Club and the ACLU win an injunction against construction of a border wall using state-of-emergency funds.

President Donald Trump signs a public lands bill that establishes 1.3 million acres of new wilderness and permanently reauthorizes the Land and Water Conservation Fund.

Trump's proposed federal budget would cut funding for the EPA by 31 percent.

In a case brought by the Sierra Club and others, a federal judge rules that the Trump administration's plan to open Arctic waters off Alaska to oil and gas drilling is illegal.

The Senate confirms former oil and gas industry lobbyist David Bernhardt as secretary of the interior despite his many conflicts of interest.

Energy Secretary Rick Perry approves six secret authorizations for US companies to sell nuclear technology and assistance to Saudi Arabia.

Reacting to public pressure driven by the Sierra Club, the Te-Moak Tribe of the Western Shoshone, and others, the US Forest Service backs down on leasing 54,000 acres in Nevada's Ruby Mountains for oil and gas drilling.

The Fish and Wildlife Service wants to remove endangered species protection for the gray wolf.

The Sierra Club's Environmental Law Program challenges oil and gas lease sales in the Gulf of Mexico and the far north of Alaska. The ELP and its allies win in court: Judges rule for tighter restrictions on toxic discharges from coal-fired power plants and to reinstate a moratorium on new coal-mining leases on public lands.

Trump falsely claims that wind-turbine noise causes cancer. ***—Paul Rauber***

Trump Watch is funded by the Sierra Club's Environmental Law Program (*sc.org/law*).

Up to Speed: Two Months, One Page

Earth's **glaciers are shrinking** five times faster than they were in the 1960s.

The United States used more energy in 2018 than ever before, partly because **Americans drove more:** 3.225 trillion miles, 12.2 billion more than in 2017.

Wolves establish themselves west of the Cascade Range for the first time in a century.

Wolves return to the Netherlands after an absence of 140 years.

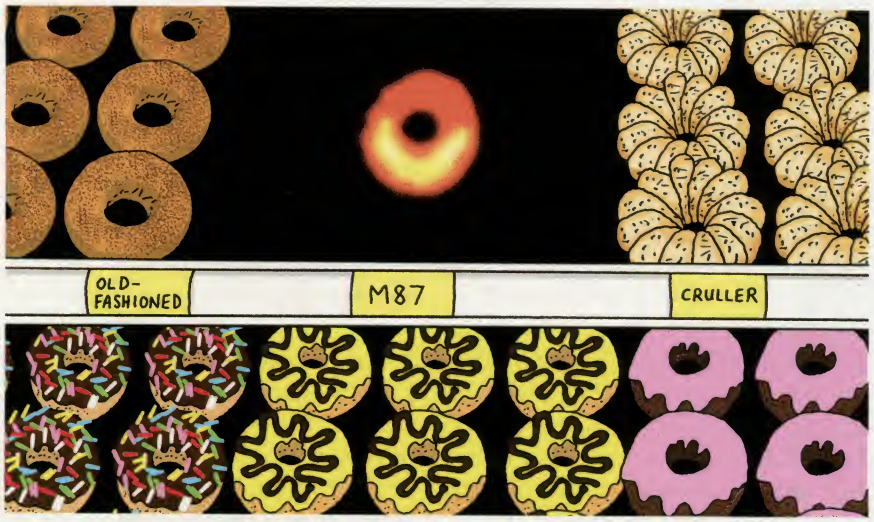
Bald eagles are scavenging garbage from a landfill near Seattle and dumping the remains in people's backyards.



A suspected rhino poacher in South Africa is trampled to death by an elephant, then **eaten by lions.**

The last time Earth's atmosphere had as much carbon dioxide as it does today, there were **trees growing near the South Pole.**

Thawing ice on Alaska's Denali is exposing the **66 tons of frozen feces** left by generations of mountain climbers.



Scientists capture the **first image of a black hole (M87)**—"like looking at the gates of hell."

Sea level rise has cost property owners on the East and Gulf Coasts more than $16 billion since 2005.

Detroit's notoriously polluting **trash incinerator ceases operation.**



Senator Mike Lee of Utah says that the solution to climate change is to **"fall in love, get married, and have some kids."**

It would now be **cheaper to replace three-quarters of existing coal-fired power plants** with locally generated wind and solar than to continue operating them.

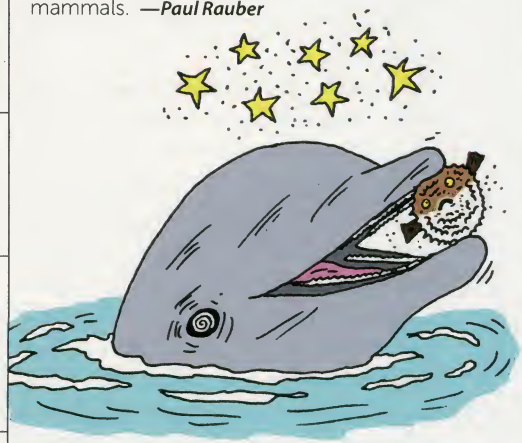
Greta Thunberg, the 16-year-old Swede who inspired the Youth Climate Strike, is **nominated for the Nobel Peace Prize.**

The "apocalyptic fungus" Bd—*Batrachochytrium dendrobatidis*—has caused the decline of 501 amphibian species and the extinction of 90.

The stomachs of dead whales found in the Philippines and Italy are full of plastic trash.

Scientists discover a likely **new species of orca** off southern Chile—"the largest undescribed animal left on the planet."

Dolphins use toxic puffer fish to get high by provoking the fish to release toxins that induce a trancelike state in the mammals. ***—Paul Rauber***

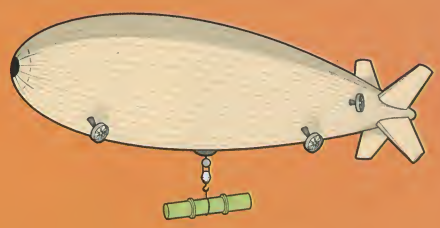


MORE ONLINE For sources, visit *sierraclub.org/uptospeed.*

ILLUSTRATIONS BY PETER ARKLE

Fly the Electric Skies

Airlines got a pass in the 2015 Paris Agreement. The reason? It's tricky to assign airplane emissions to any one country. But if we want to keep flying and stop pumping carbon dioxide into the upper atmosphere, where it's especially damaging, air travel will have to go electric. Here are a few ways that could happen. *—Heather Smith*

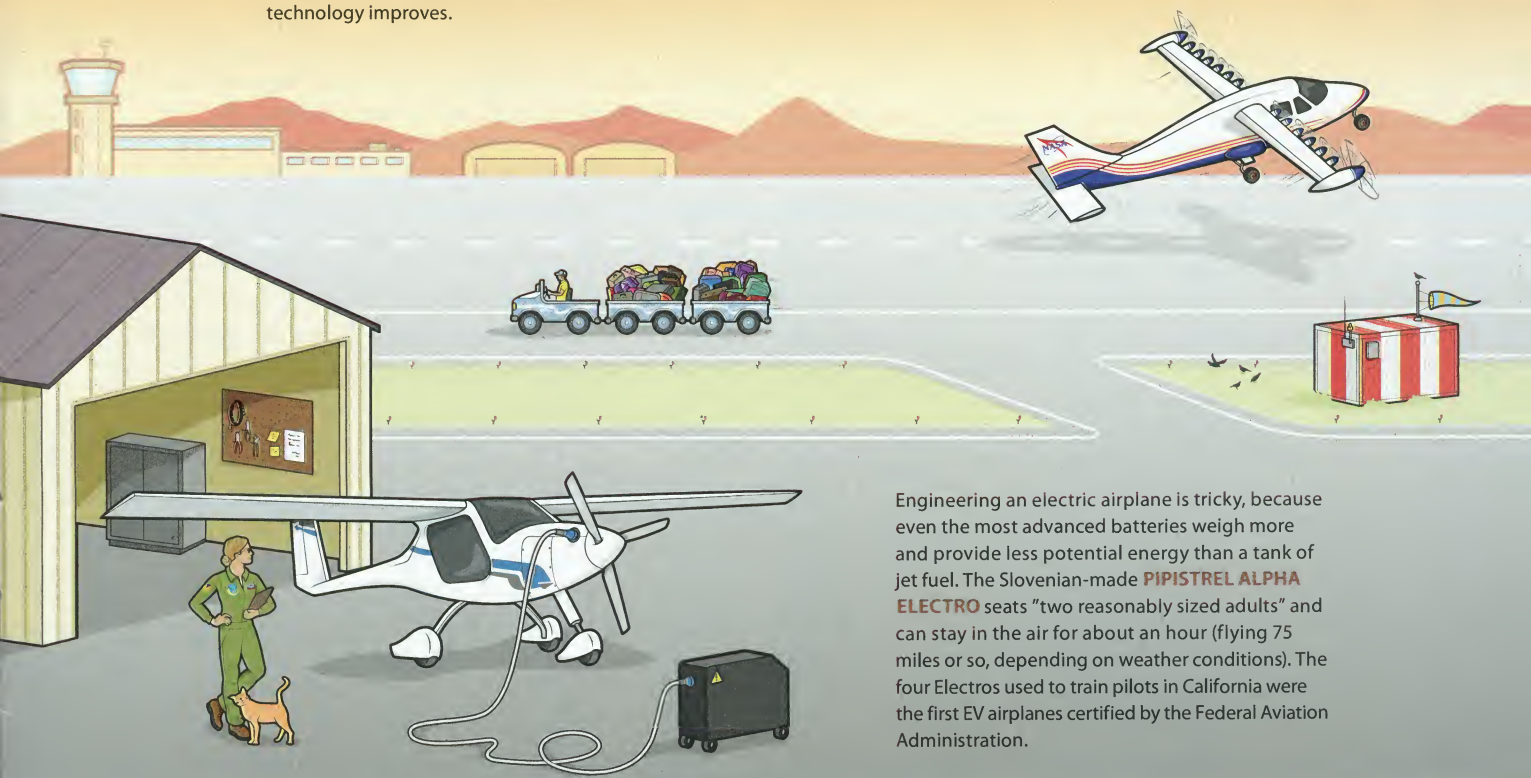


Airships travel at a fraction of the speed of airplanes, and there isn't enough helium in the world to deploy them in huge numbers, but a single airship can carry a lot of cargo. The **LCA60T,** which the French company Flying Whales plans to have in production by 2022, will be able to carry 60 tons, powered by a small electric or hybrid engine. The LCA60T is being developed to assist in logging and drilling in roadless areas, but blimp boosters maintain that they could also be used for wind-turbine delivery.



Several EV aircraft developers are adding more passengers and longer range with gas-electric hybrids that can fly between regional airports. **ZUNUM AERO,** which plans to start test flights this year and begin delivering planes in 2022, is designing hybrid aircraft that could carry 12 passengers about 700 miles. The aircraft will transition to fully electric as battery technology improves.

The **NASA X-57 MAXWELL**—a one-seat test vehicle scheduled to take its first flight this year—has one of the most far-out designs: Fourteen separate motors and propellers along its wingspan help it use energy more efficiently during liftoff.



Engineering an electric airplane is tricky, because even the most advanced batteries weigh more and provide less potential energy than a tank of jet fuel. The Slovenian-made **PIPISTREL ALPHA ELECTRO** seats "two reasonably sized adults" and can stay in the air for about an hour (flying 75 miles or so, depending on weather conditions). The four Electros used to train pilots in California were the first EV airplanes certified by the Federal Aviation Administration.

INFOGRAPHIC BY BROWN BIRD DESIGN

Solar Boot Camp

Levi Running, all-weather solar installer

WHEN I WAS YOUNG, I LIVED IN A TRAILER PARK with my mom in St. Paul, Minnesota. There wasn't a lot of nature where we lived. But when I was 12, I started playing disc golf. The course I played was on a trail in the woods, and at each stop you threw your disc in a basket. I would come across cool animals—deer and birds. Then when I saw on TV how habitats for animals were getting destroyed, I wanted to make a difference for them.

At 15, I moved south to live with my grandparents in Cottage Grove, where there's a lot of cornfields and woods. My grandfather would take me to the Boundary Waters Canoe Area—that showed me what a place looked like that hadn't been touched by human development. He'd organize trips there for recovering addicts. It's super peaceful—you aren't allowed to use motorboats or build any structures there. The water is so clear, you can see 30 feet down.

Living with my grandparents was good for me. I had good jobs in sales, construction, and the tool industry. But I'd lose them because of the time spent with my friends. I was into pot a lot back in the day. Then I started selling. One day, when I was 31, this guy wanted to trade money and meth for my car. I told him no several times. But I needed the money, since I was living in my grandfather's house after he passed away. So I sold the car. The guy turned out to be an undercover police officer. Then the police found my grandfather's antique hunting shotgun. I was charged with first-degree drug possession and sales and second-degree possession of a weapon.

I spent one and a half years in county and state prison, the last six months in a boot camp program run by the Minnesota Department of Corrections for people who don't have a record of violence, sexual misconduct, or arson. The boot camp was out in the wilderness in northern Minnesota with no fences; it changed my life. It gave me structure and taught me discipline. We had sobriety training and learned how to get a job and manage money, and we took GED classes. It's like the military: Every day you run four miles at 5 A.M. Your bed must be made perfectly, your uniform must be pressed, your boots and buckle must be shined, and your face must be shaved. A lot of guys complained, but I was excited to be working outside all day.

During the last part of boot camp, I did a solar-installation training put on by the Midwest Renewable Energy Association. We were taught everything from how to read a wire to calculating the solar potential of a site to putting up a solar array. There was a lot of homework, which we did on top of our regular activities. At the end of the training, I was ready for a job in the solar industry.

After release, I got a job with a company called Nesco. On my first day, I worked on installing an array with a tracking system and motors. Soon I was one of the lead guys, because I knew what I was doing. Minnesota has crazy weather, so our working conditions can be challenging. We do a lot of large commercial arrays and put up solar panels with two feet of snow on the ground. My hands and feet used to freeze until I got boots rated for 94 below and insulated deerskin gloves. Instead of telling myself I'm too tired, I just beast-mode through it. Now, after six months, they want me to be a trainer and lead.

I'm also training to be a journeyman electrician. It takes 5,000 hours—about four years—to finish. Once you're a journeyman, you have learned everything about signaling, wires, electricity, any kind of energy plug, and solar wiring—so you can do your own thing and help other people on the site.

Every day now, I'm excited to go to work—to do something that makes a difference and helps the planet. I'm actually living one of my dreams, and the reality of this recently brought me to tears. The strength I've gained is helping me raise my two-year-old son, and I'm continuing to work on my other passion of writing music and rap lyrics. In the future, I want to start my own solar company and open up a disc golf course on my own land.

—adapted from an interview by Kristine Wong

SARA RUBINSTEIN

MORE ONLINE Watch a video interview with Levi Running: *sc.org/running.*

This article was funded by the Sierra Club's Beyond Coal campaign (beyondcoal.org).


NESCO

You Can't Recycle

China no longer wants our crappy waste. That's a good thing.



Garbage



BY EDWARD HUMES

For nearly three decades, your recycling bin contained a dirty secret: Half the plastic and much of the paper you put into it did not go to your local recycling center. Instead, it was stuffed onto giant container ships and sold to China.

Around 1992, US cities and trash companies started offshoring their most contaminated, least valuable "recyclables" to a China that was desperate for raw materials. There, the dirty bales of mixed paper and plastic were processed under the laxest of environmental controls. Much of it was simply dumped, washing down rivers to feed the crisis of ocean plastic pollution. Meanwhile, America's once-robust capability to sort, clean, and recycle its own waste deteriorated. Why invest in expensive technology and labor when the mess could easily be bundled off to China?

Then in 2018, as part of a domestic crackdown on pollution, China banned imports of dirty foreign garbage. In the United States, the move was depicted almost as an act of aggression. (It didn't help that the Chinese name for the crackdown translated as National Sword.) Massive amounts of poor-quality recyclables began piling up at US ports and warehouses. Cities and towns started hiking trash-collection fees or curtailing recycling programs, and headlines asserted the "death of recycling" and a "recycling crisis."

But a funny thing happened on recycling's road to the graveyard. China's decision to stop serving as the world's trash compactor forced a long-overdue day of reckoning—and sparked a movement to fix a dysfunctional industry. "The whole crisis narrative has been wrong," says Steve

Many of the plastic materials that US consumers try to recycle—especially plastic bags—never get recycled at all. They're just trash.



China has shut down its inefficient, polluting "recycling villages" in favor of modern facilities.

Alexander, president of the Association of Plastic Recyclers. "China didn't break recycling. It has given us the opportunity to begin investing in the infrastructure we need in order to do it better."

"That's the silver lining in National Sword," adds David Allaway, a senior policy analyst for Oregon's Department of Environmental Quality and the coauthor of a surprising new study that demonstrates the ecological downsides of pursuing recycling at any cost (see "When Recycling Isn't Worth It," page 29). "China finally is doing the responsible thing, forcing the recycling industry to rebuild its ability to sort properly and to focus on quality as much as it previously focused on quantity."

Paradoxically, Allaway says, part of America's trash problem arose from people trying to recycle too much. Well-meaning "aspirational" recyclers routinely confuse theoretical recyclability with actual recycling. While plastic straws, grocery bags, eating utensils, yogurt containers, and takeout food clamshells are all *theoretically* recyclable, they are almost never recycled. Instead, they jam machinery and lower the value of the profitably recyclable materials they are mixed with, like aluminum cans and clean paper. In addition, Americans are notorious for putting pretty much anything into recycling bins, from dirty diapers to lawn furniture, partly out of ignorance and partly because China gave us a decades-long pass on making distinctions.

"We need to recycle better and recycle smarter," Allaway says, "which means recycling only when the positive environmental impacts outweigh the negative."

MARTIN BOURQUE is the executive director of the Ecology Center, the nonprofit that handles curbside recycling for Berkeley, California. During the early days of recycling, in the 1970s and '80s, he says, US consumers routinely cleaned their recyclables of food residues and separated materials. Berkeley residents originally sorted recyclables into seven categories, including by color of glass.

That system changed in the 1990s, when a rapidly industrializing China started to aggressively import mixed paper and plastics from western countries to get feedstock for the products that it was manufacturing and exporting back to those same countries. This coincided with a consolidation of the US trash business into the current dominance of a few large corporations, which were happy to let China do all the work. US trash collectors and recycling facilities found that they could elevate quantity above quality and make more than $20 a ton doing so.

Offshoring cut labor and transportation costs and reduced the need to update sorting and cleaning machinery. Cities and waste companies abandoned methodical curbside sorting in favor of the far cheaper and now predominant single-stream method, in which all recyclables go into one bin that's picked up by one trash truck. Only minimal sorting by the collectors was required, as different kinds of plastic (including types that

► **Plastic objects without a recycling symbol are not recyclable.**



A redemption center in Brooklyn, New York. Bottle bills like the one in New York boost recycling rates and provide needed income to homeless and other marginalized people.

can't be recycled) could be packaged into giant, stinky bales. People felt virtuous throwing most everything into the recycling bin—never suspecting that the system was guaranteed to contaminate and render useless much of it.

Mixed paper could be bundled in the same way, much of it contaminated from mingling in the bin with dirty dog food cans and worse. These bales would be taken to the nearest port and loaded onto container ships bound for China—4,000 containers a day prior to 2018. Other countries did the same, and by 2016, China was importing more than half of the world's plastic and paper trash.

As much as 30 percent of those single-stream recyclables was contaminated by nonrecyclable materials, Bourque says. Many of the bales of plastic sent to China were worthless and were never even recycled. Instead, they ended up polluting land and ocean outside China's impoverished, unhealthy "recycling villages," the shantytowns full of mom-and-pop recycling businesses that lined the edges of China's big port cities, reeking from caustic chemicals and burning garbage.

Jenna Jambeck, a University of Georgia scientist and a leading researcher on the extent and origins of ocean plastic pollution, has visited these villages and seen their dire conditions. "They were given no infrastructure to work in or to manage discards from the recycling," she says. A 2015 study coauthored by Jambeck found that 1.3 million to 3.5 million metric tons of plastic flowed into the ocean from Chinese coastal sources each year.

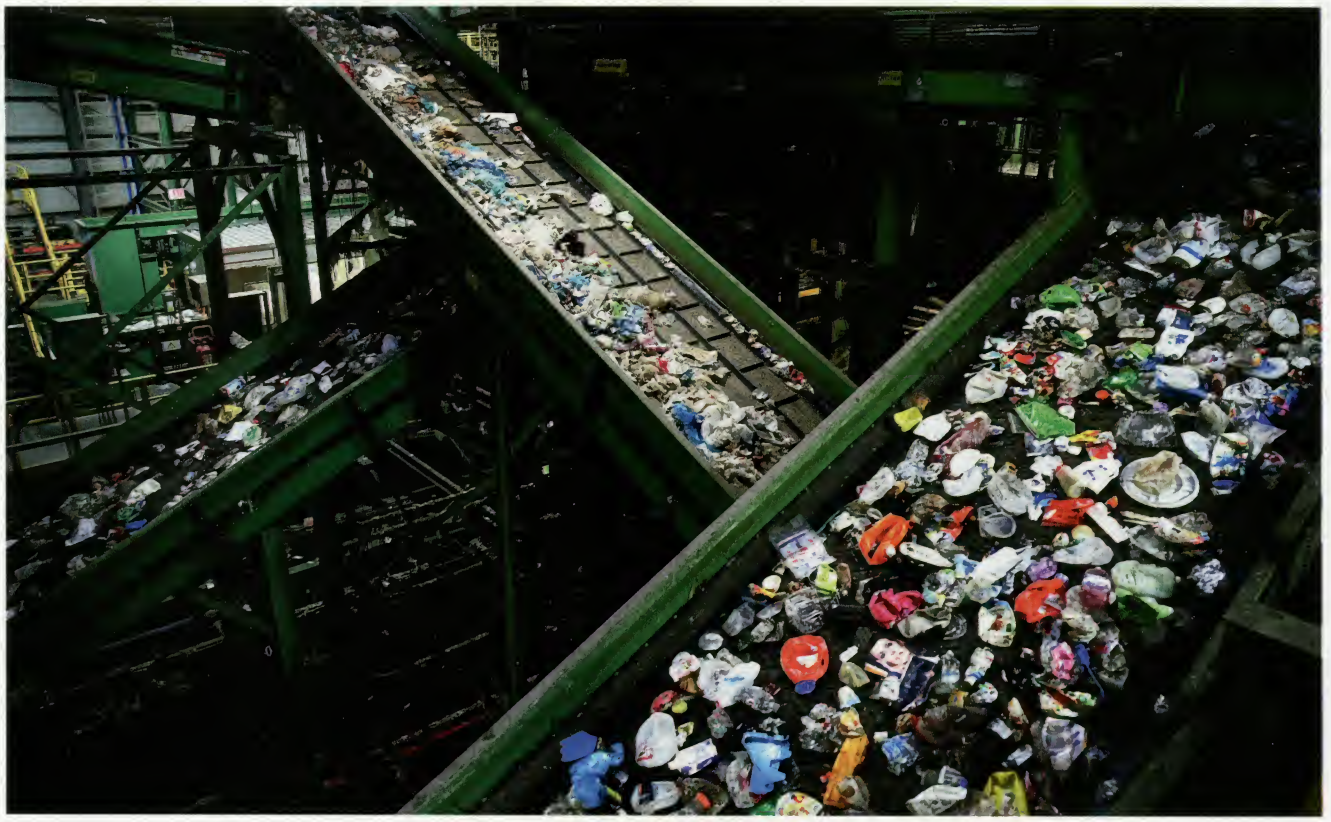
But now China has a burgeoning middle class and its own growing consumer economy with its own waste and recyclables, leaving little appetite for trash from other countries. Jambeck is among those who believe that National Sword's import ban, along with China's efforts to clean up the recycling villages and construct clean, state-of-the-art sorting and recycling facilities, is helping to stem a crisis more than it is causing one. "China's regulatory action exposed a sore that was already there," she says. "People weren't noticing since it had a bandage on it."

As early as 2013, China began warning US recyclers that it intended to address its own environmental problems and would limit contamination of recycling imports to 0.5 percent. (The mixed bales of paper and plastic the United States was shipping to China typically had 30 to 50 times that level.) But few believed that China would carry out its threat, so when the new rules came, US recyclers were caught with their polyester pants down, incapable of cleaning their recyclables enough to meet China's new standards, let alone those of US manufacturers seeking recycled feedstock.

The lack of preparation for China's import ban created pain and chaos in communities across America. Some recyclers, predictably, began searching for countries desperate enough to fill in for China. Vietnam, Malaysia, and others did so for a time, only to be overwhelmed by the stinking tide. (Vietnam and Malaysia have since shut the imports down.) Prices for

Don't try to recycle anything smaller than a credit card.

PREVIOUS SPREAD: PHOTO-ILLUSTRATION BY D-KEINE/GETTY IMAGES
LEFT: CHINA PHOTOS/GETTY IMAGES; ABOVE: SPENCER PLATT/GETTY IMAGES



Plastic bags, straws, and wrap frequently clog the conveyor belts at this recycling center in Brooklyn, New York.

recyclables dropped to a fraction of what China once paid, often far below the cost of gathering and shipping the material. Bales of mixed paper that previously sold for $155 a ton could barely fetch $10. "What this crisis is really about," says Vinod Singh, outreach manager for Far West Recycling in Portland, Oregon, "is shifting from the artificial situation China created, in which recycling more than paid for itself as a commodity, to the new reality of recycling as a cost."

The economics were shocking. Stamford, Connecticut, went from earning $95,000 from its recyclables in 2017 to paying $700,000 in 2018 to get rid of them. Prince George's County, Maryland, went from earning $750,000 to losing $2.7 million. And Bakersfield, California, swung from earning $65 a ton for its combined recyclables (glass, plastic, paper, metal) to paying $25 a ton. "Recycling facilities seemed to be spinning gold with China dominating the market," Singh says, "but it was an illusion that could not last."

Some communities started sending their overflowing recyclables to the landfill, as happened in Portland and elsewhere in Oregon, or to be incinerated at waste-to-energy plants, as in Philadelphia. Many localities were forced into a combination of rate increases for collection (most ranging from $2 to $3 a month for homeowners) and limiting curbside recycling of plastics to two or three types instead of all seven—a route taken by Hannibal, Missouri, among others. Some towns stopped recycling glass and shredded paper as well; no one wants to pay for used glass, it seems, and shredded paper confounds sorting machinery. Columbia County, New York, will charge residents $50 a year to be able to bring their recyclables to a drop-off depot. And some communities that had curbside programs have ended them altogether, including Deltona, Florida; Enterprise, Alabama; and Gouldsboro, Maine.

Kerry Getter, CEO of Balcones Resources in Austin, Texas, lays much of the blame on the big public companies, such as Waste Management and Republic Services, that do both landfilling and recycling for many communities. Those companies sold cities and towns, he says, on a recycling strategy that focused heavily on two commodities—contaminated mixed paper and mixed plastic—that only China wanted. Today those same companies are demanding rate increases to continue curbside recycling.

"There was a lack of investment in infrastructure," says Alexander of the Association of Plastic Recyclers. "Now we're trying to deal with a 21st-century packaging stream based on 20th-century infrastructure. There's a strong market out there still for recycling, but we need the capability to produce good, clean material."

SINGH HAS SEEN the recycling-in-crisis narrative repeatedly in his career. "We were dead in 2008 too," he recalls. "We've reincarnated many times."

Far West has weathered the recent turmoil fairly well, Singh

► **Remove contents, such as food waste, from containers before recycling.**

When Recycling Isn't Worth It

Sometimes a landfill is the most benign option

FOR DECADES, ENVIRONMENTALISTS' go-to strategy for discarded consumer goods has been "zero waste"—attempting to recycle everything. A recent study from the Oregon Department of Environmental Quality, however, suggests that our faith in recyclability as a universal good is misplaced.

"Just because something is recyclable does not necessarily mean that it's healthy or has a small footprint," says David Allaway, a senior policy analyst for the Oregon DEQ and coauthor of the counterintuitive report. "Recycling is generally beneficial, but just because something is recyclable or compostable doesn't necessarily make it the lowest-impact choice for the environment."

For example, with disposable packaging, recyclable choices more often than not result in more harm to the environment. "We are spending a lot of time and energy on maximizing recycling," says Allaway, "when in reality we need to be *optimizing* recycling." To put it another way, we should stop asking whether we *can* recycle something in favor of whether we *should*.

Prior to this study, there had been no systematic scientific research into whether the recyclable choice is always the best choice for the environment. The idea makes intuitive sense, it's appealing, and it comes with an obvious strategy for fixing things. But unfortunately, science tells us that recyclability is a crappy indicator of environmental good.

The Oregon report comes at a time of general upheaval in US recycling policy (see page 24). Its implications are causing soul-searching in environmental circles. Oregon is reimagining its entire approach to solid waste and recycling in light of the report. But for others, the study's conclusions—calling into question the fondest zero-waste aspirations of some of our greenest cities—are a large pill to swallow.

Allaway and his colleagues show that some nonrecyclable materials that end up safely sequestered in landfills have a far lower impact on the environment than their recyclable alternatives. In over half the comparisons made between recyclable and nonrecyclable packaging, the nonrecyclable option wins: The recyclable packaging sometimes causes greater overall harm when it comes to climate, water conservation, ecotoxicity, eutrophication, smog, acidification, or other forms of pollution and depletion.

Consider, for example, an unrecyclable laminate pouch containing tuna that ends up in a landfill. Its environmental effects across the board are far lower than those of a highly recyclable steel tuna can made of significant amounts of recycled steel. The pouch requires less energy to manufacture, and its light weight makes it more efficient to transport. Similarly, an unrecyclable Amazon mailing pouch requires fewer resources and less energy than a highly recyclable cardboard box, even if the mailer ends up in a landfill. The same is true of wine packaged in difficult-to-recycle aseptic cartons versus glass bottles.

The Oregon report, a metastudy of hundreds of life-cycle analyses of packaging, containers, food service ware, and compostables, is not a critique of recycling. When done correctly, recycling is almost always beneficial. Packaging that includes recycled materials—metal, plastic, glass, or paper—almost always has a lower footprint than packaging made of virgin material.

"Recycling is good, and we need more recycling and better recycling," Allaway says. "What the data is telling us is that recyclability and compostability are radically insufficient indicators of low environmental impact. What we're seeing here is that these attributes are not enough by themselves to inform good decision-making."

The underlying problem, as Allaway sees it, is that recycling is focused on solving the problem of garbage. But the US garbage problem is very small when compared with the environmental impacts of *producing* the stuff we throw away. And, he adds, big industry is very satisfied with the current arrangement: As long as everyone is focused on recycling and curbside collection, it's a consumer and government problem. If we shift focus to production, then it's a manufacturer and big-brand problem. "Encouraging people to obsess on recyclability and compostability is a convenient red herring," he says.

Meanwhile, laws are being proposed around the country—like A.B. 1080 in California, which is supported by the Sierra Club—that would ban all single-use plastics, including low-impact laminate pouches.

Instead of mandating recyclable materials that make no environmental or economic sense, Allaway says, we should focus on policies that favor low-environmental-impact choices. Recycling, after all, is a means to a goal, not the goal itself: The prize we should keep our eyes on is protecting the environment and conserving natural resources, not recycling everything at any cost. ***—E.H.***

MORE ONLINE Read an interview with David Allaway: *sc.org/allaway.*



KADIR VAN LOHUIZEN/NOOR; LEFT: SPENCER PLATT/GETTY IMAGES

The recycling paradox: Sometimes the environmental impact of an unrecyclable package is far less than that of a recyclable one.

says. At the plant, materials are separated, cleaned, and baled for sale to manufacturers: newsprint to paper mills, cardboard to box makers, aluminum to beverage-can makers, polyethylene terephthalate (PET) plastic to makers of water and soda bottles, and—until last year—bales of every other kind of plastic, unsorted, to China. Retaining its ability to sort materials enabled Far West to survive.

Berkeley's recycling program has survived as well, Bourque says, because it resisted the easy path of single-stream collection. Instead, Berkeley residents continued to sort, albeit more simply than in the past. Its curbside bins have two compartments: one for paper, one for everything else. This minimizes the contamination from food residue and liquids from bottles and cans that makes recycling paper difficult if not impossible. Berkeley's solution is elegant and simple—the Ecology Center's recycled materials are among the cleanest and most sought-after in the business, Bourque says.

"Our focus is keeping material clean and separated, and asking residents to do just a little bit more," he says. "It saves a lot of money for everyone."

The recycling operations that have thrived and remained profitable are those that have catered all along to domestic markets wanting clean, high-quality plastics and paper. Balcones Resources—which serves Austin, Dallas, and Little Rock, Arkansas—diversified and broadened its services. It also bought updated optical scanners that help separate plastics and reduce contamination as well as enable the plant to market over 15 grades of recycled paper instead of the usual two. Most of them, Getter notes, have maintained their price since the National Sword regulations kicked in.

The Closed Loop Fund, a $100 million effort by a number of large companies to boost recycling, is providing no-interest loans and investments to municipalities seeking to upgrade their facilities, as Balcones did. So far the fund has invested $43 million in upgrades in Colorado, Connecticut, Illinois, Minnesota, and Pennsylvania. A similar effort, Circulate Capital, funds projects in Asia, with the intention of stemming the tide of ocean plastic pollution.

Improved facilities won't mean a thing, of course, unless US consumers improve their recycling hygiene. Portland, Oregon, is one of many communities focusing on educating residents on how to recycle properly. Cleveland; Reno, Nevada; Newton, Massachusetts; and California's Marin County are now warning or fining homeowners and businesses for putting dirty or incorrect items in recycling bins. The goal is to avoid contaminating valuable materials in recycling bins with unrecyclable junk—plastic bags, plastic wrap, soda straws, and bottle caps being among the worst offenders. Clearer, standardized messaging on bins is a proven method of reducing contamination, but many cities and towns persist in using their own complex and confusing labels.

Contamination isn't only about carelessness. It's also driven by the constantly changing packaging done for marketing

China's decision to stop serving as the world's trash compactor forced a long-overdue day of reckoning—and sparked a movement to fix a dysfunctional industry.

purposes by major consumer brands—changes that are often done with little regard for whether the new packaging can be recycled. The Association of Plastic Recyclers called on manufacturers to voluntarily ensure that new packages and containers can be recycled, but a lack of progress on that front has led to legislative proposals in several states. Washington is considering a product-stewardship bill that would require manufacturers to oversee end-of-life management for all sorts of plastics, recyclable or not, and California is pondering a similar measure. The European Union has had an Extended Producer Responsibility program in place since 1994, which encourages the use of low-impact and highly recyclable packaging by making manufacturers financially responsible for packaging waste. The program is funded by $3.5 billion in annual fees from manufacturers and has resulted in a 65 percent packaging-recycling rate in the EU.

A reborn US recycling industry will need domestic markets for clean, sorted recyclables. CarbonLite Industries, a leading US recycler of plastic beverage bottles, turns 4 billion plastic bottles a year into pellets that are turned back into drink bottles. (The more common process is to turn plastic bottles into carpet or clothing.) CarbonLite is a principal supplier for Nestlé's US operations, which use the pellets to produce bottles that are either 50 percent or 100 percent recycled and can continue to be recycled many times with little degradation. "We are truly closing the loop," says Jason Farahnik, director of brand partnerships and resin sales at CarbonLite.

Demand is so high that CarbonLite's two current plants can't keep up. A third plant is due to open in late 2019, and a fourth one on the drawing board will bring the company's recycling capability to 10 billion bottles a year. That's still a pittance compared with the 140 billion bottles produced every year for US consumption, but the demand for recycled content for those bottles means there's a lot of room for growth. One factor hampering that growth is that too many beverage bottles are ending up in landfills rather than in the recycling stream.

We already know the solution to that one. Today Arkansas, Florida, Illinois, New Jersey, Tennessee, and West Virginia are considering joining the 10 states that already have

Continued on page 42

► **Plastic bottles are the only dependably recycled plastic items.**



The Indonesian government has pledged to reduce plastic waste by 70 percent by 2025.

Trash for Cash

Indonesia's global plastic problem has local solutions

IF YOU'RE IN SURABAYA, INDONESIA'S second-largest city, you can use plastic trash as bus fare—five plastic bottles or 10 plastic cups are the equivalent of a two-hour ticket. A year after this program began, each bus is collecting up to 7.5 tons of plastic a month, which the city then cleans and auctions off to recycling companies. The initiative aims to incentivize the use of public transit and to clear Surabaya's streets and waterways of the plastic trash that has accompanied Indonesia's rapidly growing economy.

Polluted groundwater and untrustworthy water supplies mean that nearly every Indonesian who can afford it buys bottled beverages. That's good for companies like Coca-Cola, which more than doubled its workforce in Indonesia between 2013 and 2018, from 60,000 to 135,000. But just because Indonesians have the money to buy more things doesn't mean that this nation, made up of 17,000 volcanic islands, has the recycling infrastructure to deal with the plastic those products are packaged in. The country is now the world's second-largest source of oceanic plastic pollution, surpassed only by China—which has over four times Indonesia's population.

Waste management tends to be ad hoc in Indonesia. Many provinces and cities lack regular trash or recycling pickups and rely on informal waste pickers, who abandon what they can't use with little fear of consequences. For many islands, the ocean has become a dump for waste.

Last year, the central government announced that by the end of 2019 each city will need to have a plan in place to help meet Indonesia's national goal of reducing plastic pollution by 70 percent by 2025. Cities will have a lot of leeway in how they approach the issue, and some regions are already experimenting with solutions.

The province of Bali concluded that much of the plastic on its beaches was trash collected from its own resorts and hotels, which had been illegally dumped in rivers only to wash back up onshore. Last year, Bali passed a law banning single-use plastic bags, plastic straws, and Styrofoam, and it's considering a $10-per-head tourist tax to fund cleanup. Several Indonesian cities have banned plastic bags.

Over 2,000 independently operated collection sites known as "trash banks" also operate across the country. People bring in organic waste (which is turned into compost) and recycling that can be either exchanged for cash or stored as credit—providing basic banking services for the poor. Indonesia's trash banks get varying levels of support from local governments. In some cases, a city or regional government will pay a set cost for plastics.

The national government is also partnering with Indonesia's two largest Islamic organizations, Nahdlatul Ulama (NU) and Muhammadiyah, to connect religious values with the fight to reduce plastic waste. "Islam is a religion that teaches people to care [for] and conserve the environment, including the plastic problem," says Dr. Ir. Muhjidin Mawardi, chairman of Muhammadiyah's environmental division. NU and Muhammadiyah published the book *Waste Management From an Islamic Perspective* and produce "sermons on waste," or Ngaji Sampah, that are broadcast online monthly.

Late last year, a dead sperm whale washed ashore on Kapota Island—part of Wakatobi National Park and the Coral Triangle, an area that is home to some of the richest marine biodiversity on Earth. Researchers performed a necropsy and found over 13 pounds of plastic: 115 plastic cups, 25 plastic bags, four plastic bottles, and two flip-flops.

"It made quite an outcry," says Tiza Mafira, a lawyer and a cofounder of Gerakan Indonesia Diet Kantong Plastik, a nonprofit focused on ending consumption of single-use plastics. "Partly I think it was because of a sense of injured pride that one of our best tourism spots has been sullied by pollution." Even a decade ago, Mafira says, "there was a mind-boggling culture of not being aware of how much plastic we're consuming and how unnecessary it is."

Sweeping national solutions remain elusive. A proposed tax on products containing plastic—similar to a tax Indonesia already has on tobacco—was dropped after a trial in a few cities in 2016 but may be revived this year in a more limited form, applying only to plastic bags.

What gives Mafira hope is how the issue continues to gain importance. In the past five years, she has seen awareness build. Soon, she says, there will be no more ignoring it. ***—Nithin Coca***

RAFI AKHDANTYO/AFP/GETTY IMAGES


Wichita slugger

WHO WANTS TO KILL THE ELECTRIC CAR THIS TIME?

THE KOCH BROTHERS HOPE IT WILL BE THEM

BY BEN JERVEY

IN FEBRUARY, Senator John Barrasso, a Wyoming Republican who chairs the Senate Committee on Environment and Public Works, introduced a bill to end the federal tax credit for plug-in electric vehicles and establish a new annual "highway user fee" for all "alternative fuel vehicles." If the bill becomes law, these provisions of the Fairness for Every Driver Act would check off two high-priority boxes on the policy wish list of Charles and David Koch, the billionaire petrochemical barons who have built a fortune on the transport and refining of fossil fuels. And this is no coincidence.

Barrasso is the third-highest recipient of campaign donations from Koch Industries, and in remarks on the Senate floor as well as in an op-ed published on the Fox News website, he cited figures from reports funded by the Koch brothers and their donor network. Speaking in the Senate, Barrasso said that the EV program "disproportionately subsidizes wealthy buyers" and that "hard-working Wyoming taxpayers shouldn't have to subsidize wealthy California luxury-car buyers." In effect, Barrasso justified the bill almost entirely with arguments—many misleading, some demonstrably false—tested and refined for years by Koch-affiliated think tanks, advocacy groups, and astroturfing operations.

Senator Barrasso's bill is just one example of how the Koch brothers and their Big Oil allies are working to decelerate the country's transition to electric cars. "The Koch network is opposing pro-EV policies at all levels of government, in public utility commissions, state legislatures, and the US Congress," says David Arkush, managing director of Public Citizen's climate program. "The campaign is classic Koch—a mix of front groups, campaign cash, corporate cronyism, and deception."

Several years ago, oil companies began to see EVs as a real threat to their businesses. Electric-car sales, virtually nonexistent when President Barack Obama took office, were rising consistently (though more than 1 million Americans have bought or leased an electric vehicle, EVs still represent only about 2 percent of new car sales). By the beginning of 2016, a new generation of plug-in cars targeting the mass market had been announced—including the Chevy Bolt, the updated Nissan Leaf, and Tesla's Model 3—all of which were promising 100-plus miles of range and a price tag around $30,000 after the federal tax credit.

About the same time, the Koch network began preparing a calculated campaign to keep gas-guzzlers on the road. In late 2015, a couple of key Koch agents started meeting with oil-refining and marketing companies to pitch a new "multimillion-dollar assault on electric vehicles," according to a *HuffPost* investigation. James Mahoney, a Koch Industries board member, and Charles Drevna, a former president of the American Fuel and Petrochemical Manufacturers, were raising funds to defend the oil and gas industry from stronger fuel-efficiency standards and transportation electrification.

In December 2015, an organization called Frontiers of Freedom, a front group that has received millions from ExxonMobil and Koch Family Foundations, created the Energy Equality Coalition with the express purpose of fighting the EV tax credit. The group's slogan for EVs is "Built by billionaires, bought by millionaires . . . and subsidized by the rest of us." Then, in 2016, Drevna launched an outfit named Fueling US Forward, which balanced oil and gas cheerleading with aggressive EV bashing. The group produced a YouTube video, "The Hidden Costs of Electric Cars," that described the EV tax credits as a "massive wealth transfer from poor to rich."

Fueling US Forward and the Energy Equality Coalition were part of a constellation of Koch-affiliated and Koch-funded organizations that created and amplified talking points and deceptive statistics, all with the aim of putting the brakes on the mass adoption of electric cars. When the Energy Equality Coalition launched, one

ILLUSTRATION BY STEVE BRODNER

of the group's board members, George Landrith, told *The Weekly Standard,* "Working-class people are paying taxes to subsidize luxury goods for the richest among us. . . . We believe there should be energy equality, not special treatment for the wealthy." Landrith's interview introduced rhetoric that would be employed by the Koch network for years. There was a two-page advertorial in *The Hill,* paid for by Koch Industries: "Such [hybrid and EV tax] credits may seem enticing to the general public, but the reality is that 90 percent of the beneficiaries come from the top income bracket." A brief written by Robert Bryce of the Manhattan Institute (which received more than $2.6 million from Koch foundations between 1999 and 2015) argued for a repeal of the tax credit: "Despite the endless hype about electric cars, vehicles that plug into the grid remain a niche product that is sold almost exclusively to the affluent."

These well-honed talking points were hammered into subsequent op-eds, commentaries, and interviews during the next few years, until they eventually made their way onto the Senate floor, where Senator Barrasso argued, "Nearly 80 percent of the tax credits go to households earning at least $100,000 a year." (Barrasso's point misrepresents the truth, because the figure doesn't include leased vehicles. More than half of all electric cars on the road are leased.)

Meanwhile, the Koch network is even better equipped to fight electric cars at the state level, exploiting two organizational structures that the Koch brothers have invested in heavily for decades: the American Legislative Exchange Council and Americans for Prosperity. For the inside game, the Kochs rely on ALEC, a "membership association of state legislators" that is, in fact, funded predominantly by private interests and is commonly described as a "corporate bill mill."

"State lawmakers and lobbyists gather at high-end hotels to vote equally on so-called model legislation, which legislators can take back to their state legislatures and introduce as state policy," says Jamie Corey of Documented, a watchdog group that examines corporate influence in public policy. "Koch Industries funds numerous organizations and trade associations within ALEC," Corey says, citing a 2017 membership document revealing that "Koch-funded organizations and its companies had the largest representation at their annual meeting."

In recent years, ALEC has put electric vehicles high on its agenda. In 2018, the American Energy Alliance introduced an ALEC resolution to enact punitive annual fees for driving plug-in vehicles—and many states took the bait. Today, there are at least 24 states with newly adopted EV fees, and 15 other state legislatures are considering them this year. By comparison, in 2015, only nine states had EV fees like those introduced by ALEC.

Such legislative efforts are then amplified by Americans for Prosperity, the "grassroots" advocacy organization heavily funded by the Koch brothers network. When state lawmakers are debating EV policies, or when there's a critical ballot initiative, AFP will often lurch into gear. In Colorado, the AFP chapter campaigned hard for a 2017 bill that would have repealed the state's EV tax incentive, and this year has launched an aggressive social media effort to rally against proposed clean-car standards. In Illinois last year, AFP lobbied against new state subsidies for EV charging infrastructure.

WHAT YOU CAN DO

Interested in checking out EVs for yourself? Register for a National Drive Electric Week event near you: *driveelectricweek.org.*

Environmental activists say that the Koch network's concern for a "level playing field" between conventional cars and EVs is little more than concern trolling. "These fees are unfairly punitive for EV drivers, while barely making a dent in state coffers," says Gina Coplon-Newfield, director of the Sierra Club's Clean Transportation for All campaign. She points out that EVs provide real benefits to states, since their lower weight reduces road wear and their lack of tailpipe emissions improves air quality and benefits public health. And, Coplon-Newfield says, for states genuinely concerned about losing gas-tax revenues to EVs, increasing state gas taxes by a mere penny would generate more money than raising registration fees for EVs. "AFP has put out resolutions to their conservative pro-oil-and-gas members, and those members and their allies have their marching orders. Now is the time to incentivize, not penalize, people for switching to cleaner transportation choices."

Though the AFP efforts to eliminate Colorado's EV tax credit ultimately failed, and the fate of the Illinois state subsidies is still unknown, the Koch network has other victories to boast. In Nashville, Tennessee, the AFP chapter rallied hard against a mass transit plan in 2018. The transit project had been viewed positively by two-thirds of voters until an AFP campaign kicked off, featuring local front groups, exhaustive door-to-door canvassing, and the use of the Kochs' private voter-profile-data network. Voters ultimately killed the transit plan.

The fate of Senator Barrasso's bill is undecided, though its companion act in the House is likely dead on arrival. In any case, the fight over the future of EVs is just beginning. An electrified transportation system would make the Kochs' core businesses obsolete—and, knowing as much, the Kochs are likely to keep their influence and policy machine churning. "The electric-vehicle market is growing extremely fast," Arkush says. "They're popular, peppy, and clean—and increasingly they're cheaper than conventional cars when you factor in lower costs of maintenance and savings on fuel."

What's not to like? "They aren't powered by oil," Arkush says, "and that's a nonstarter for the Kochs, who want to keep lining their pockets with profits from fossil fuels." ■

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SUVs WITHOUT SHAME

AMERICANS LOVE SPORT-UTILITY VEHICLES. Two out of three vehicles sold today are SUVs, minivans, or pickups. That's a huge problem for the planet—except that, finally, SUVs come in shades of green.

These SUVs are crossovers, meaning they sit on car platforms instead of truck chassis. Hybrid SUVs are widely available, some with plug-in variants for electric-only driving. There are also zero-emission battery electric models, two of which are featured here. They're expensive but should get cheaper as battery prices decline. All prices for the 2019 models below include destination charges but not federal tax credits (up to $7,500) or state rebates. Note that the federal subsidy is tapering off for Tesla and General Motors buyers, as those companies have reached the mandated limit of 200,000 vehicles sold. ***—Jim Motavalli***

KIA NIRO PLUG-IN HYBRID

The battery electric version of the Niro is available in only 12 states, but the plug-in hybrid is available everywhere. The $29,500 price makes this car far more affordable than most of the battery electric SUVs. A small 1.6-liter, four-cylinder engine pairs up with an electric motor for 139 horsepower. The all-electric range via an 8.9-kilowatt-hour pack is 26 miles, and that results in 560 miles between fill-ups. A small battery means quick recharging, even on a house current. The Niro is eligible for a $4,543 federal tax credit.



MITSUBISHI OUTLANDER

This plug-in hybrid was a hit in Europe before its delayed entry into the US market. Delivering the equivalent of 74 miles per gallon, the Outlander is also fast-charge-capable, using the Japanese CHAdeMO standard, which gives an 80 percent charge in 25 minutes. Drawbacks? Only 310 miles of total range and no third row of seats. It's modestly priced at $35,800, and a $5,836 federal tax credit is available. Recent upgrades include refreshed styling (the European version was released in 2014), standard LED headlights on the GT version, and a warranty that covers loss of battery effectiveness.





AUDI E-TRON

A real heavyweight, the 5,500-pound Audi e-tron has twin electric motors (168 horsepower front, 188 rear). Shift to Sport mode and another 33 horsepower is released (for a total of 389), but for only eight seconds at a time. The five-passenger e-tron can reach 60 miles per hour in 5.5 seconds, and (very optimistic) European testing gives it a range of 248 miles from a 95-kilowatt-hour battery. Starting at $75,800, the car bristles with high-tech electronics, including a digital display and Amazon Alexa. The e-tron is part of Volkswagen Group's effort to reposition itself in the wake of its diesel scandal; VW is introducing four more battery vehicles in coming years.



TESLA MODEL X (AND Y)

The Model X (with room for seven) has been criticized for its finicky "falcon wing" rear doors but gets kudos for its performance and 295-mile range. The regular model starts at $83,200 and has a 100-kilowatt-hour battery, while the high-performance version has a slightly reduced range but can go from zero to 60 in 3.5 seconds. The Model Y, unveiled in March and on sale next year, is a lower-priced crossover based on the Model 3, which is proving to be a big seller for Tesla.

MORE ONLINE For more 2019 models, visit *sc.org/suv-guide*.

JIM MOTAVALLI *writes about greening the auto industry for* Barron's *and NPR's* Car Talk. *He is the author of* Forward Drive *and* High Voltage.

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The Utah Way

HOW A POLITICALLY CONSERVATIVE STATE SET SOME OF THE MOST AGGRESSIVE GOALS FOR CLEAN ENERGY

BY EMMA PENROD

IT'S IMPOSSIBLE TO VIEW the Salt Lake City skyline without noting six castle-like spires, at the top of which stands the golden statue of Angel Moroni blowing his horn. The famous towers of the Latter-day Saints temple rise in the city's midst, framed by the snowcapped Wasatch Range. To the west stand the three concrete stacks of the Gadsby power plant. Owned

Utah's 306-megawatt Milford Wind Corridor wind farm spans the length of Beaver and Millard Counties, delivering energy to Los Angeles, Burbank, and Pasadena in Southern California.

and operated by the state's dominant electric utility, Rocky Mountain Power, the plant once burned coal but switched to gas in the 1990s. Though most photographers crop images of the city to omit them, Gadsby's triple stacks are visible from almost any vantage point in the Salt Lake Valley—a seeming monument to the state's historic reliance on coal.

They also mark the place where Utah's carbon legacy may have come to an end.

In March 2016, Park City passed a resolution committing the city to transitioning 100 percent of its energy to renewable sources by 2032. Then in July 2016, Salt Lake City announced its own commitment. Moab, the redrock mecca, did the same at the beginning of 2017, followed later that year by Summit County. Soon after, Salt Lake suburbs such as Cottonwood Heights also joined in.

The commitments, which took the form of joint resolutions establishing community-wide goals for clean energy, transcended traditional political norms and reflected a growing understanding among the state's elected officials, environmental advocates, and industry and business leaders: They had no choice but to act on climate. The state is getting hotter, and snow is melting earlier, threatening not only the tourism and recreation industry on which many livelihoods depend but also the water supply.

Yet one very big puzzle still had to be solved. For these resolutions to succeed, cities needed the buy-in of Rocky Mountain Power—a state-regulated monopoly operated by PacifiCorp that for generations has been notorious for burning coal. Utah cities, except for a handful that produce their own power, are legally required to buy energy from the utility. Any Utah city that wanted to switch to renewable energy had two choices: start its own electric utility from scratch or convince the coal-reliant utility to join it.

At the end of 2016, representatives from Salt Lake City, Park City, and Summit County quietly organized a series of meetings at Rocky Mountain Power's Utah headquarters, near the Gadsby power plant, to discuss how cities committing to 100 percent renewable energy could achieve that goal in partnership with, rather than opposition to, the utility. They emerged last February with the HB 411 Community Renewable Energy Act—legislation that promises to provide any Utah city wanting to achieve net-zero emissions with a path for doing so by 2030. In March, Utah governor Gary Herbert signed it into law, and Rocky Mountain Power publicly embraced it.

What started as a years-long grassroots movement to abandon dirty energy evolved into the sort of private negotiation process that local politicians, to the amusement and occasional dismay of residents, have dubbed "the Utah way." Faced with a populace that is known for strong opinions about agreeableness, advocates knew that climate action would require an especially collaborative approach.

"We have to be wise about how we fight our battles," says Glenn Wright, a Summit County council member who helped craft HB 411. "Getting out in front and calling the utility names is not the path to success. We have to figure out how to work with the people who have traditionally been our environmental enemies."

HB 411 EMERGED FROM THE SORT OF PRIVATE NEGOTIATION PROCESS THAT LOCAL POLITICIANS, TO THE AMUSEMENT AND OCCASIONAL DISMAY OF RESIDENTS, HAVE DUBBED "THE UTAH WAY."

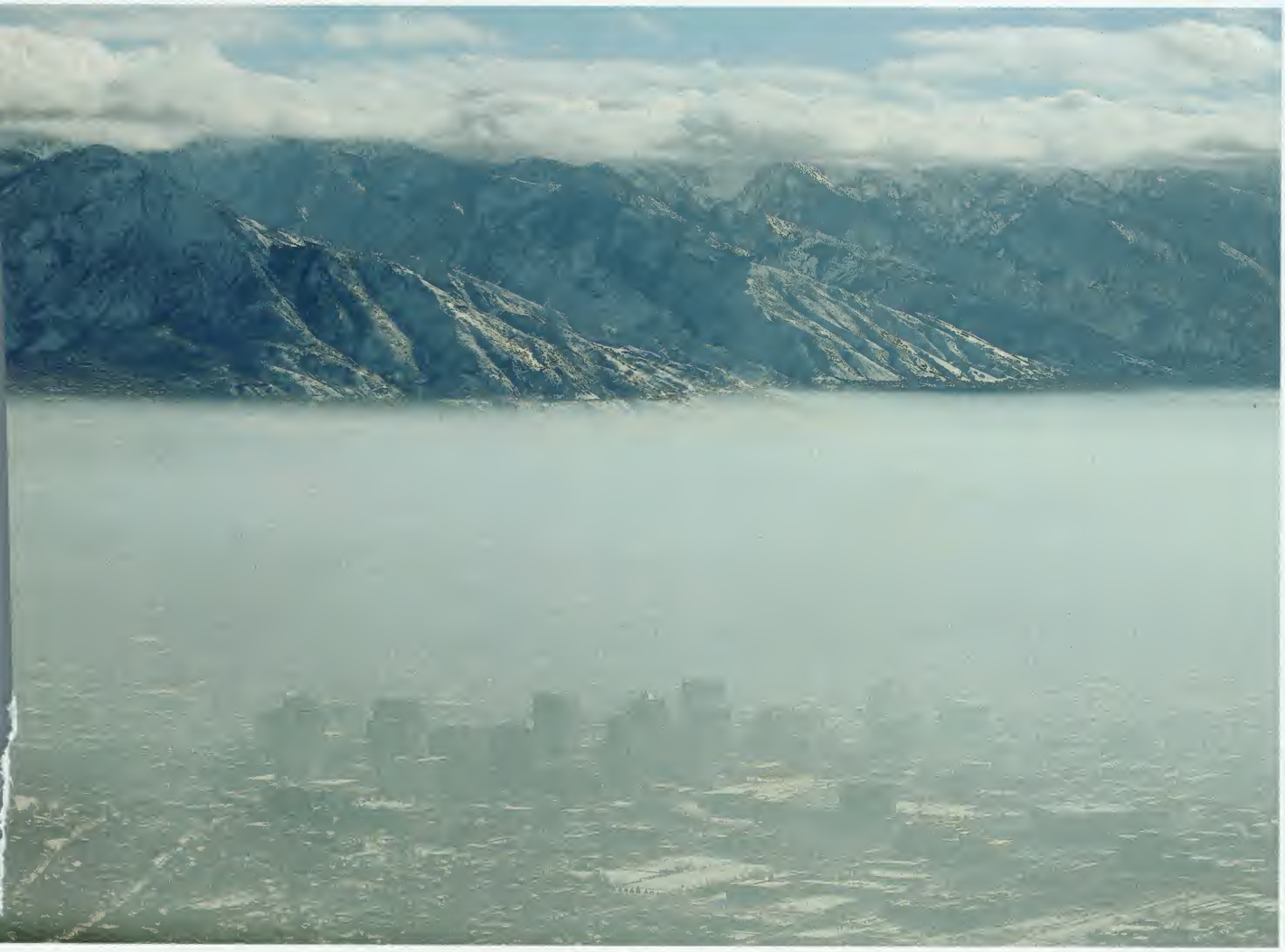
ON THE RIDGES AND PEAKS above Salt Lake City, some reaching 11,000 feet, the snow is smooth and powdery light—this is home, according to many skiers, to the world's most perfect snow. "And when it's not snowing," says Park City resident Bryn Carey, "it's dry, bluebird-sunny days. It's the best of both worlds."

It won't be for much longer if the planet keeps warming.

In Park City, where some 3 million people come every year for hiking and biking and the powdery slopes, Carey runs one of the most successful ski-rental-delivery companies, Ski Butlers. He first moved to the city in 1997 with his family but returned to the East Coast for college. His father encouraged him to go into business, and for a time, Carey ran his own asphalt company. After graduating, he moved back to Park City to take some time off and enjoy the epic slopes. That's when another entrepreneurial idea occurred to him: a service that would deliver skis, poles, and other equipment to people going out of town for ski trips. Carey started Ski Butlers by supplying rentals out of his one-car garage. The business was so successful that he expanded to Vail, Colorado, within a year.

Before long, Carey realized that one of the biggest threats to the ski industry he loved was climate change. Approximately 70 percent of Park City's economy depends on winter recreation. In April 2019, Climate Central released a report listing the five states in the country warming the fastest. Utah came in at number five, with a 3.02°F increase in the average temperature over the past 48 years.

But there's more at stake than just the state's tourism industry. Salt Lake City, which sources drinking water from the surrounding mountains, estimates that in the past 20 years Utah winters have shrunk by five weeks. Drinking water for nearly 1 million Utahns comes from snow that falls in the Wasatch Range.



For years, Salt Lake City has struggled with fine-particle pollution, often in the form of winter smog.

Carey became determined to act. In 2012, he spent months trying to gain support for a business initiative to install solar panels on every roof in Park City, but that proved impossible. It was up to the city, he eventually concluded, to bring clean energy to every resident.

Then in 2015, the council announced it was crafting a new slate of policy goals for the city and invited residents to offer their feedback at a meeting. Carey rallied his employees and organized grassroots activists to convince residents that clean energy should be one of those goals. The effort paid off; dozens of people turned out to the meeting.

Luke Cartin, the environmental sustainability manager for Park City, was impressed. "When you have 50 to 150 people show up at a city council meeting demanding action and no one speaking in opposition, the city council feels the urge—this is a priority."

The city council agreed to make energy and climate change Park City priorities. Council members suggested a benchmark for achieving 100 percent renewable energy at some point between 2040 and 2050; Carey feared that was insufficient and recommended 2030. The council members concurred, setting a goal of 2032, which they later dropped to 2030 when Salt Lake City was selected as a possible location for the Winter Olympics.

Carey is just one grassroots activist among many who came together to compel Park City officials to act. Not long after the meeting, the city launched a series of initiatives—from solar on almost every public facility to an all-electric bus fleet—and formally passed a resolution committing to clean energy. Park City, with a population just shy of 10,000, had emerged as a climate leader in the state. But city leaders quickly determined that city-produced clean energy would be cost-prohibitive. To be successful, they would need Rocky Mountain Power to generate as much renewable energy as the city typically uses in a year.

They soon learned that a conversation with the utility had

PREVIOUS SPREAD: DOUGLAS BARNES; TOP: JEFFREY D. ALLRED/*THE DESERET NEWS*/AP

already quietly begun in Salt Lake City. It was a discussion led by two women, both of whom had just assumed their positions: the mayor of Salt Lake City and the CEO of Rocky Mountain Power.

BY 2015, SALT LAKE COUNTY had violated federal air-quality standards for over a decade. Researchers estimated that up to 30 Utahns could develop lung cancer each year as a result of dirty air.

"The community was really frustrated," says Mayor Jackie Biskupski, sitting in her historic downtown office. (Biskupski, a Democrat, was elected in 2015, becoming the second woman to lead Salt Lake City and the city's first openly gay mayor.) "They were frustrated with the state. They were frustrated with our energy company. . . . This community in particular had had it with Rocky Mountain Power."

One of Biskupski's first tasks as mayor was to negotiate the city's new contract with the utility. At that time, its CEO, Cindy Crane, had been on the job for just under two years. Biskupski started meeting with Crane, and over time, the two of them did more than just work through the details of the new contract. They discussed a shared vision for the future of Salt Lake City—one that took a clean environment and the real threat from climate change into account.

Having women at both ends of the table opened up new opportunities for compromise, Biskupski notes. "There's less ego at the table. There's less bullying. There's more desire to listen," she says. "This was a very unique window of opportunity, and why more women need to be at the table in these conversations."

Changes in market forces were also on Biskupski's side. As recently as 2015, Rocky Mountain Power had defended its relatively small investments in renewable energy on the basis of cost: While solar power cost 10 to 20 cents per kilowatt-hour, the company asserted, coal-fired power cost just three to four cents. Last December, however, PacifiCorp released a report revealing that, thanks to rapidly decreasing renewable energy prices, it would save millions if it closed as many as 13 of its coal-fired units before the end of their anticipated life spans. (The report reflected conclusions from research commissioned earlier by the Sierra Club, which stated that power from 11 of the company's 24 coal-fired units cost more than current market rates.)

One significant hurdle in the negotiations remained. The coal-fired power plants that PacifiCorp owns in Utah are relatively new, having opened in the 1970s, and the company hasn't paid off the investments in them. The parties deliberated until a mutually agreeable solution could be reached.

"We pulled our stakes up, and we moved to the middle, successfully so," Biskupski says. "Did we have moments where people wanted to throw their arms up? Sure we did. But when that happens, you have to bring everybody back to the table and remind them: This is the journey. This is the commitment. The people, they want clean air."

They agreed on a solution: Cities committed to 100 percent clean energy would continue to pay down the coal plant debts.



Rocky Mountain Power CEO Cindy Crane, left, and Salt Lake City mayor Jackie Biskupski worked together to craft a clean energy plan.

SCOTT G. WINTERTON/*DESERET NEWS*

After the utility and city leaders collaborated on and agreed in principle to the terms, they were ready to establish them as law. But they would also have to convince the state's conservative legislature to buy in.

A COALITION OF OFFICIALS from Salt Lake City, Park City, Moab, and Summit County assembled draft legislation that would provide a framework through which cities committed to 100 percent clean energy could source that energy from Rocky Mountain Power. Once the bill was completed, city leaders approached Utah legislators in early 2019.

Climate change is not a popular topic on Utah's Capitol Hill. Even so, the HB 411 Community Renewable Energy Act had all the hallmarks of a successful bill. The act applies only to those communities that want to participate. Even then, residents can opt out—a move intended to placate conservatives who fret about big government taking away individual choice. Any additional costs and benefits will be isolated to those willing to pay more for clean power.

The majority of bills brought before the Utah legislature pass with unanimous or near-unanimous approval. Unpopular bills aren't voted down—they're simply left to languish until the state's legislative session ends, which kills any unheard bills by default. To avoid that fate for HB 411, and

p Rocky Mountain Power at the table, the coalition had entionally kept the first two years of negotiations more ess secret. Once the Community Renewable Energy Act made public in January, environmental advocates were e to weigh in. Lobbying efforts continued late into the l day of the legislative session, set to end at midnight on rch 14. Finally, the Utah Senate voted 23-6 in favor of bill, with a few hours to spare.

till, while HB 411 was a landmark effort, for some it sn't go far enough.

It's a really great concept, but we are still a bit worried ut implementation, because a lot of this legislation puts ky Mountain Power very much in the driver's seat," says ristopher Thomas, a senior representative of the Sierra b's Beyond Coal campaign.

IB 411 does not require Rocky Mountain Power to ramp vn on coal, only to ramp up on renewable energy sources cities committed to 100 percent clean energy. Thomas nts out that real, effective action on climate will require we stop burning coal altogether. Rocky Mountain Power rates two multiunit coal-fired power plants in Utah: one Castle Dale and one in Huntington. The utility recently ounced plans to close four coal-fired power plants, but e of the Utah units made the list.

While some clean energy advocates were disappointed by lack of transparency in the creation of the bill, others eve that the HB 411 process was the only way to secure mmunity-based renewable energy for Utah. Michael Shea senior policy associate with HEAL Utah, a group that ocates for clean air and the safe disposal of hazardous te. HEAL, like Utah Clean Energy and other environ-tal organizations, was left out of the initial negotiations nd HB 411, according to Shea. Yet he believes it had to pen that way to see success.

The Utah way is not protesting and shouting from the tops that this needs to happen," he says. "The Utah for better or worse, means you have to be collaborative he inside. There is no way that this could have made it igh both the utility and the legislature without some of collaboration on the cities' part."

WILL IT TAKE to transition Utah off coal completely? ommunity Renewable Energy Act, Biskupski says, is "enabling legislation." The real question is whether Utah's rural coal-mining communities will join Park City—itself a former mining town—and others in signing on to HB 411. Changes in leadership add to the uncertainty: Crane retired in 2018, and Biskupski has announced plans to retire.

But other city leaders, including Beaver County commissioner Mark Whitney, are ready to keep up the momentum toward clean energy. Beaver County is a rural community in Utah's southwestern corner. Many Utahns know it as a nondescript sagebrush plain on the way to Las Vegas or St. George, but according to Whitney, it's the unsung renewable energy capital of the world.

The county has a century-long legacy of renewable energy generation—the town of Beaver has used locally produced hydropower since 1908. In the past 10 to 20 years, the county has acquired wind and solar farms and a biogas project. It also has three geothermal power plants in operation. Some of the energy generated by Beaver County's wind, solar, and geothermal companies (such as First Wind) powers homes in California. Whitney helped lobby for the Community Renewable Energy Act and is now traveling the state to convince fellow rural commissioners to make clean energy commitments by the end of the year—the deadline required by HB 411 for communities to set achievable 2030 clean energy goals.

The case for renewables shouldn't be that hard to make, according to Tom Holst, a senior energy analyst with the Kem C. Gardner Policy Institute. Rural Utah "is blessed with a lot of renewables," he says—ample wind and solar potential that could grow rural economies throughout the state. "All of these rural communities have access to renewable resources," Holst says, "and they have the ability to develop them."

In addition to harnessing wind and solar energy, Holst says, the state also has significant potential to develop geothermal energy. It is already the nation's third-largest producer of geothermal, and according to the US Energy Information Administration, Utah may be among the states with the greatest geothermal potential.

BRYN CAREY ONCE WORRIED that his climate advocacy would threaten his business. Now he hopes to see Utah's enthusiasm spread to rural areas outside the state as well. In September, Ski Butlers will help host Mountain Towns 2030, a conference encouraging communities throughout the Intermountain West to commit to net-zero electricity by 2030.

"People want to do good and be a part of something, and people want to help out with climate change, but they don't know what to do," Carey says. "It's actually really easy to motivate what they call the 'climate army.' But you have to show people the way." ■

EMMA PENROD *is a science writer, author, and historian based in rural Utah.*

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HAVING WOMEN AT OTH ENDS OF THE BLE OPENED UP OPPORTUNITIES COMPROMISE.

Recycling *continued from page 30*

container deposit laws, a.k.a. bottle bills, which require refundable deposits on all single-use beverage containers (plastic, glass, or metal). Bottle bills are the single most effective means of boosting recycling; it's no coincidence that the states that have them also lead the nation in recycling rates. The beverage industry has historically opposed such legislation, including attempts to adopt a national bottle bill.

"RECYCLING IS SUPPOSED to be the last resort after reduction and reuse," says Bourque, and Berkeley's Ecology Center continues to find innovative ways to push the issue, most recently in a new city ordinance to take effect in January 2020 that will impose a 25-cent charge on all disposable cups sold in the city, including coffee cups. "Why are people sitting around for hours in coffee shops drinking out of paper cups?" Bourque asks. "It's absurd when reusable ceramic cups are such a better option." In addition, disposable utensils, straws, and napkins in eating establishments and coffee shops will be available only upon request or at self-serve stations; takeout food must

Bottle bills are the single mos effective means of boosting recycling; it's no coincidence the states that have them a lead the nation in recycling ra

come with compostable containers and utensils; di food must be served on reusable dinnerware.

"This ordinance is focused on upstream impacts," Bo says. "It brings reuse back in a big way. If you reuse more what's left really is recyclable and *gets* recycled." ■

EDWARD HUMES *is a Pulitzer Prize–winning journalist a author of 15 nonfiction books, including* Garbology: Our Love Affair With Trash.



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Faith in Clean Energy



Name: Penny Hooper

Location: Smyrna, North Carolina

Contribution: Conservation chair of the Sierra Club's Croatan Group

HOW DID YOU GET INVOLVED WITH THE SIERRA CLUB? I've been a member since 1986, but the nearest group was three hours away, so I wasn't active. In 2014, there was a chance to develop wind power in our area. The Sierra Club helped us out, and we were able to form a local group. We ended up losing the fight for onshore wind, but we gained the Sierra Club.

ARE YOU FROM NORTH CAROLINA? No. My husband and I moved to the coast here in 1974 to start a commercial fishing business—soft- and hard-shell crabs. It's extremely labor-intensive. We also raise clams and oysters. We live at the end of a dirt road. The nearest town is 20 minutes away. It's been a good life for us and our kids, but it revolves around clean water and air.

WHAT ISSUES DO YOU WORK ON? Renewable energy is a big focus of mine, and I serve on several statewide committees. I've also been consumed for the last three years with trying to stop offshore drilling and seismic blasting. The economy here centers on tourism and commercial and recreational fishing, so the issues cross partisan boundaries. There are endangered right whales off the coast here too. And of course, it puts my husband out of business if there's an oil spill. Clams don't eat oil.

WHAT DO YOU DO ASIDE FROM VOLUNTEERING FOR THE SIERRA CLUB? My husband and I were both professional divers, and we still dive a lot. I'm also very involved with NC Interfaith Power and Light, which works on climate change through faith-based communities.

ARE CONSERVATIVE CONGREGATIONS RECEPTIVE TO YOUR MESSAGE? All faiths have their own version of creation care, and you just have to point that out. I taught environmental biology for 16 years at a local community college. I know the facts on climate change back and forth, but the facts are not working. So now I work from the heart instead of the head.

TELL ME SOMETHING ABOUT YOURSELF THAT MOST PEOPLE DON'T KNOW. In 1972, I lived underwater for seven days in something called the Hydrolab. It was part of my research for my master's degree.

AND YOU DIDN'T GET CLAUSTROPHOBIC? I had the whole ocean! I'd just go out for a dive, you know, like you go out for a walk. Back in the 1970s, my husband and I were total idealists and thought that people could live underwater in little communities. It hasn't happened, but it was a good thought. ***—interview by Wendy Becktold***

TOP: CHARLES HARRIS; BOTTOM: ALBERT D HORNER

A Double Win for the Garden State



New Jersey Pinelands National Reserve is a UNESCO-designated biosphere reserve.

Residents of south New Jersey are breathing easier since the coal-powered B.L. England Generating Station, which had been polluting the air along the Atlantic coast since 1962, shut down for good last spring. In 2006, the state mandated that the plant comply with emissions standards. In response, operators developed a plan to switch to natural gas, a move that would have created more pollution, since the retrofitted operation would run more frequently. It would also have interfered with New Jersey's goal of transitioning to 100 percent clean energy by 2050.

In February, in the face of longtime opposition from community members and environmentalists, operators notified the state that they were abandoning the retrofit and would permanently shut down the plant. The decision was a twofer for the environment, because a proposed 22-mile gas pipeline slated to carry the natural gas through New Jersey Pinelands National Reserve is now on hold indefinitely.

Local activist Georgina Shanley has seen firsthand the coal plant's health and environmental effects—the surrounding area has been plagued with high rates of cancer and, she says, childhood asthma. For her, this victory is just the beginning; a second natural gas pipeline that would cut through the reserve is still in the works. "When you look at what young people are doing all over the world against this climate crisis," Shanley says, "we owe it to them to continue the fight." ***—Mukta Patil***

My Very Own Wildfire

BY DAVID McDANNALD

Fighting a wildfire on family land is like fighting to protect your children—your body will exhaust every ounce of its strength. After a dry-lightning strike one September at my great-uncle's West Texas ranch, I ran to the ridgetop to find flames burning in a wavy, quarter-mile line. Lacking water and tools, I stripped off my khakis to beat the flames and crushed incandescent brush with my boots. Two volunteer firefighters eventually climbed to the ridge, and with axes we hacked down smoldering yuccas.

Two weeks later, lightning struck again—this time on steeper ground, the dry grass thick, wind whirling in erratic breaths. Trembling at the edge of my endurance, just inside the fire line, I pumped and sprayed water from a five-gallon backpack. Then my stream died. I dashed to the nearby tanker truck to refill the pack and was halfway back when the wind kicked up and swept the flames downhill fast enough to overtake a running deer. A wet blessing thundered out of Mexico that night, dousing the 200-acre burn. Back on the ridge the next morning, I hacked into yucca roots for the hidden embers that can burn internally for days.

My years at the ranch taught me how simple life is, in the way familiar to older peoples. It gave me, through communion with nature and contact with hunters, migrants, and cowboys, an experience of life that reaches far back into history. Even beyond the era of homelands, I am of that land.

Eventually, young cousins inherited the ranch, but wanting lives elsewhere, they sold it. At home on the Navajo Nation in Arizona, I consoled myself with the dream of someday selling a script and buying back a canyon.

Three years later, at 3:30 on an April morning, a train conductor peered north into the darkness and saw the glow of burning grass. Once again, generous volunteer firefighters limited the lightning-scorched footprint to a few acres. And then drove home.

But out of some simmering yucca or clump of sacahuiste, a flame slipped back into the grass. The fire soon grew large enough to need a name. An out-of-date map led someone to dub it the McDannald Fire. Within hours, it raged beyond the scope of the volunteer crews, blackening the slopes of Mt. Livermore in a smoldering catastrophe hotter than land had evolved to cope with.

When I read the reports, I felt sick. A fire sharing my name was ravaging the place on the planet I knew best, whose language I had tried—species by species and ridge by ridge—to gain fluency in. With a new life near Bears Ears National Monument and a recent marriage to a lovely psychologist, I thought I'd moved on from West Texas, but the McDannald Fire made plain that the ranch and I are connected in ways independent of my presence there. I don't own the land. The land owns me.

So once 388 firefighters had extinguished the blaze, Christine and I drove to Texas. We pitched a tent in partially burned forest that stank of mildewed ash. Most of the trees stood blackened within silvery scars of incinerated brush. Declining rainfall and the drying up of springs meant the forest was perhaps already a relic, doomed never to regrow. Mourning the destruction felt akin to mourning a person.

At dawn, gnats flew into our unzipped tent. Ants and beetles scoured the scorched ground. Charred trees rang with birdsong. While the fire had raged, I'd comforted myself with visions of planting seedlings in the ash. But the canyons will stand as they always have, only poorer and harsher, at least for my lifetime. Perhaps it's better if we cease to experience what land can mean. Then at least we'll be saved from knowing that we're homeless.

DAVID McDANNALD's *story "Baby Jack's Dark Journey" appeared in the March/April 2009 issue of* Sierra.

Mourning the destruction felt akin to mourning a person.



ILLUSTRATION BY LEONARDO SANTAMARIA

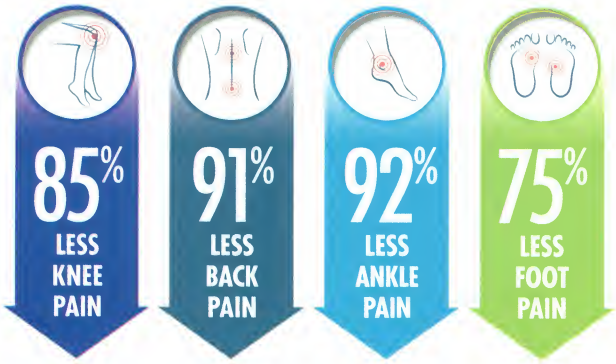
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